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The Independent Guide to
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The Independent Guide to
IBM Personal Computers

VOLUME 3 NUMBER 25
DECEMBER 25, 1984

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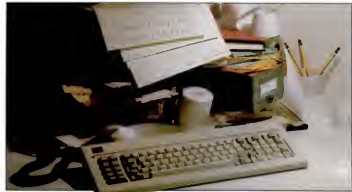
*Diane Burns and Sharyn Venit/*Microsoft's Chart offers features not available with other spreadsheet graphics software.

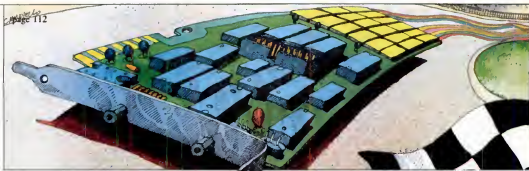
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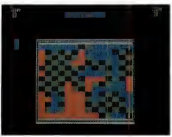
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Cover Photography: Dennis Chalkin

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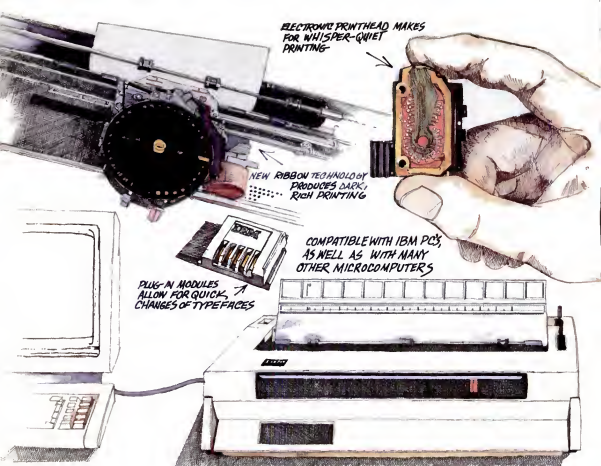
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List Magazine

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Digital Review

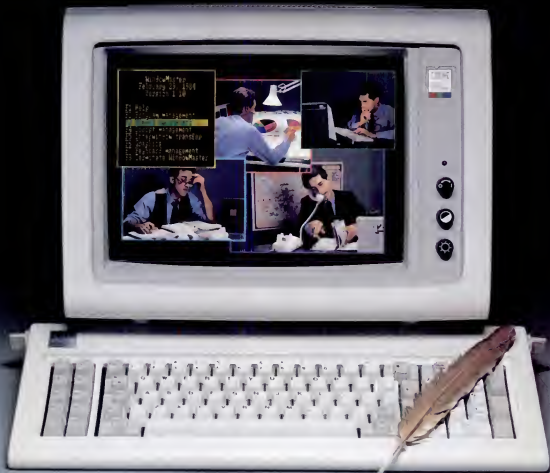
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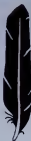
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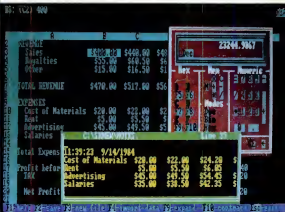
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What's Inside

Contributing editor Robin Webster struggles with multifunction board reviews in sunny California while sun-worshipping PC staffers vie to join him at our West Coast lab.

Contributing editor Robin Webster should be a very happy man—at least, in the opinion of most of the PC staff here in New York. He has been assigned a job that most of us here would give up our hard disks for: West Coast bureau chief of the *PC Magazine* research lab out in sunny (sigh) California. He doesn't have to fight freezing weather, moribund subways, and kamikaze bicycle riders in order to get to work—all he has to do is coast into the parking lot at Belmont Lab, adjust his shades, and stroll into the facility like a true California techie (albeit one with a British accent).

Robin, however, had very little time to be smug about his circumstances. He hardly had time to greet lab head Steve Kanzler when he immediately plunged into two huge projects, one of which was to organize this issue's rundown of plug-in boards for the PC.

I called Robin while he was in the midst of trying to assemble some type of ornate computer networking system (project number 2, to be covered in a future issue) and asked him how things were going on the issue.

"Well, we started with list of 60 companies," he began morosely, "and found that about a third of them either are no longer in business or their phones were disconnected. Many still in busi-



ness said, 'No, we no longer manufacture boards. It's too cutthroat.'

"Microsoft, for example, had been selling a RAM board and a multifunction board. I called to ask for review units. The lady on the line said, 'Fine.'

"However, a little while later she rang back and said, 'Sorry, we're no longer selling them. We found that they are not conducive to the kind of business we're getting into.'"

Only the Strong Survive

In fact, Robin found that only a few board-producing companies were actually doing well: those that have been around since the board business got start-

ed and know the field well enough to survive. "For example," he said, "when I spoke to dealers, they said they were selling 50 AST boards for every one they sold from any other manufacturer."

Webster also learned not to make any assumptions about the microcomputer field. One of his assumptions fell flat when he found that the more expensive boards really were more sophisticated than the cheaper ones. "I thought," he admitted a bit sheepishly, "that the larger companies were simply adding a big price markup for a little extra work. Well, it turns out that the cheaper boards are actually less well designed and supplied with less sophisticated or comprehensive software."

"For example, one board came with some badly documented RAMdisk software that could have been obtained free of charge from any bulletin board system," Webster laughed. "I guess you do get what you pay for."

Apparently, some of the hardware was also a bit more durable than one would expect. "We had an interesting experience with the JRAM-2 from Tall Tree Systems," Robin reported. "It shipped its board to Peter Feldmann in Santa Barbara by courier express service. The board did indeed arrive on time—beautifully bent into the shape of an S."

"Well, Peter did his best to push and

WHAT'S INSIDE

straighten it back into shape. He then put it into his PC, and, lo and behold, it worked. It was a good indication of the product's durability."

(Nervous manufacturers should note that it is not *PC Magazine's* usual policy to submit products to that particular type of stress test.)

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Opportunity of a Lifetime?

Meanwhile, back in New York, the editorial department was holding a lottery to see who got to visit Webster in California to "supervise" the editing of the manuscripts. In spite of attempts by persons who shall remain unnamed to "load the dice," justice prevailed; associate editor Jennifer de Jong was bundled happily onto a plane heading west.

Jennifer spent a week out on the coast, helping Webster and his cohorts to pull the project together. However, she found that she didn't really have much time to bask in the sun. She spent most of her time running through the hallways of the lab, trying to find Webster (who was running through the hallways, trying to find necessary equipment). Jennifer returned to us only slightly browner.

Some of her and Robin's communication problems might have been eased if they had used the modem boards that writer Dan Rubis reviews in this issue. He examines and compares eight of these handy pieces of hardware. And the ever-popular Winn Rosch reviews the new PCTurbo-186 board, which, according to Rosch, is the closest you're going to get to turning your PC into an AT.

Incidentally, executive editor Mike Edelhart reports that he was recently accosted by a friend who happens to read *PC Magazine*. The man bustled up to Mike, shook his head disgustedly, and yelled, "Listen, I always thought you were a nice guy, a real mensch. But I've been reading What's Inside—you're always running around, yelling at people. It sounds like a real madhouse!"

Well, in all fairness to Mike, we thought we should put the record straight. Yes, occasionally things do get a trifle sticky around here, especially just before deadlines. And yes, there is sometimes a bit of confusion during large projects. But, all in all, we're actually a group of very nice, reasonably sane individuals. (Okay, Mike, I put it in—now will you please get that magnet away from my disk file?) ■

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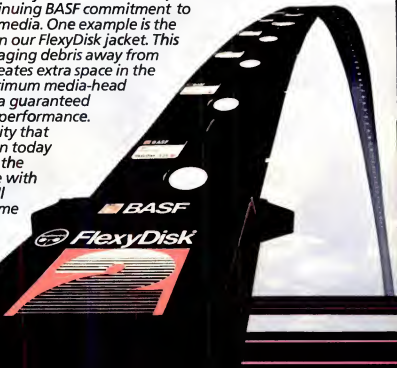
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It has a format mode for tab setting or wraparound and shaping when it's time to write documents. PMATE lets you "chain chains of commands or strings of text to single keys, a keystroke could set up the entire shell of a new C function, for example.

PMATE has variables, if-then statements, loops, it calculates, and converts decimal to base 16 binary and back. You can write complex programs (called "macros") to delete comments, for example, or check syntax, or process long sequences of commands. Macros can alphabetize lists, do row and column math, perform a series of operations on multiple files, even summon other macros.

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The Greenleaf Comm Library supports ASCII or binary, any parity, any word length, 8250 UARTs, all four Lattice C memory models, Hayes 300, 1200, 1200B and other modems. Its page menu has examples of each function, describes asynchronous communications, and both the library and demo programs with source (a max of C and assembler).

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BASIC C

Use Your Knowledge of BASIC to Learn C

If you're getting the message that switching from BASIC to C would be prudent, you're about to discover that it's back to basics of a different sort. BASIC is full with hidden functions that stripped down C just doesn't have.

Gone are all those handy string manipulators like LEFT\$, MID\$, STRING\$, etc. (although our library offerings add them back) In C, when you reach for even simple invocations like INPUT or PRINT A\$(X) — well, sorry to disappoint, but expressing such expressions in BASIC is building macros when C cannot have it if it is to keep its slim profile.

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So with BASIC...C when you're thinking INPUT go ahead. Use it. Or LPRINT or LOCATE or INKEY\$. But with BASIC...C, you will find that every line of code plunges you back in the C texts to figure out how to write it. Someday you'll want to, but now, BASIC...C will start you programming quickly at the statement level so that you can concentrate on C's larger concepts.

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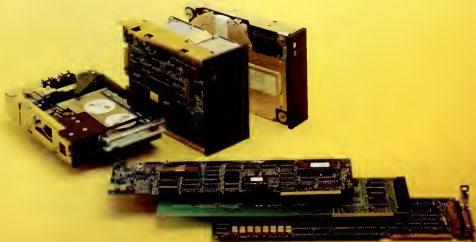
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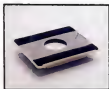
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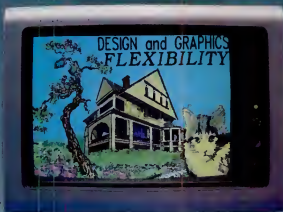
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IBM News

FROM THE EDITORS OF PC

DECEMBER 25, 1984

The Curtain Rises On The War of the Windows

BY WINN L. ROSCH

CLEVELAND—Touted as a revolutionary breakthrough in personal computing, windows can genuinely boost your productivity by allowing you to switch instantly between applications and to run several programs at once. In fact, future demand for windowing systems appears so large that a war is shaping up among several companies, each hoping to make its system the industry standard—or at least successful.

So far, however, war has meant little more than verbal volleys. Although smaller, innovative suppliers are already selling products, the three major players—Digital Research, IBM, and Microsoft—have given only glimpses and promises of their offerings.

IBM made the unprecedented move (for Big Blue, that is) of rolling out prerelease versions of *TopView* to independent software developers.

Uncharacteristically, Digital Research began marketing its version of windowing piecemeal. First, it offered a bit of multitasking and DOS-ability with an update to *Concurrent PC-DOS* in November. In January 1985, the company promises its *Graphic Environment Manager* (or *GEM*) will put Macintosh-like graphics on



your PC screen. At a future yet-to-be-determined time, *Concurrent PC-DOS* and *GEM* will merge to give you a multitasking graphic environment.

Microsoft announced that the microcomputer community should ignore the reports bandied about for the last 6 months on the imminent introduction of *Windows*. It denied that any release date had been promised and instructed everyone to wait (continued on next page)

IBM Announcements Slap More Bricks in the Wall

Big Blue shores up some gaps in its line with the latest in the corporation's flurry of fall product releases.

BY DON KENNEDY

NEW YORK—IBM's competitors must be feeling a little like Tippi Hedren in "The Birds." At first, it seemed that IBM was only offering a few pieces of hardware here, a couple of new programs there. But before anyone had time to catch their breath, Big Blue's offer-

ings had swelled to become a flock of products that threatens to swarm all over the competition.

The latest product announcements from IBM may not be of the magnitude of the AT unveiling or the release of the Personal Decision series of business soft-

ware. However, IBM has presented a series of software and hardware products to enhance the PC's position in the complete office system. The latest announcements, more than anything else, further solidify IBM's position of supplying (continued on next page)

Curtain Rises (continued)

Microsoft said the delay is necessary to ensure that the program is compact, compatible, fast, and bug-free. A close reading of Microsoft's announcement shows a major reversal in Microsoft's marketing strategy for *Windows*—and perhaps a concession to IBM of the first battle in the window wars.

Radical Changes

"Currently, the performance penalty with *Windows* running on the PC is tremendous," observes Esther Dyson, president of industry-watcher EDventures, Inc. Moreover, in current dress, *Windows* is memory-hungry, willing to swallow up 512K of RAM and 5 megabytes of hard disk space.

When *Windows* premiered in the press last year, it was hailed and promoted as a candidate to be the multitasking environment for the PC, the same goal IBM eyes for *TopView*. Today, Microsoft speaks of a different role for its product.

Steven A. Ballmer, systems software vice president of Microsoft, explains, "The goal of *Windows* is different from that of *TopView*. *TopView* and *Dosq* are designed primarily to put many applications on the same screen. *Windows* is designed to turn the computer into a graphics-rich environment."

Interestingly, Ballmer distinguishes *Windows* and *TopView* by what they will require from a PC system. He believes that *TopView* takes up too much memory, which in turn, limits the number of simultaneous applications that can run in the PC's limited 640K workspace—or limits the size of a single spreadsheet that the system can handle. Hence the effort to squeeze *Windows* into a smaller space. Microsoft promises to make the program less than or equal to 128K compared to 160K for *TopView*.

With the earlier demonstrations of *Windows* gobbling 380K of memory in a single gulp, the crash diet for the program portends not just paring the program code to elegance but reworking the entire package—enough changes to pull

Windows out of competition with *TopView* and pit it against another product—Digital Research's *GEM*.

The switch hasn't gone unnoticed. "I appreciate Microsoft's endorsement of our marketing strategy for *GEM*," notes Tom Byers of Digital Research.

Byers isn't worried about the new competition from archival Microsoft, however. He believes that his company's product can beat the revised *Windows* with lower memory requirements (60 to 80K against 128K); an earlier release date (January against June, 1985); and greater compatibility. Byers notes that *GEM* will function with *TopView*; Ballmer says you'll have to exit *TopView* to use a program in *Windows*.

Microsoft has even redefined the meaning of success in the windowing market in line with a more modest prognosis. "I would judge *Windows* a success if programmers take advantage of its tools," says Ballmer. "*TopView*'s success will be determined if people buy a lot."

The Winner?

With the recent changes among the windowers, which system will be the big winner?

"The one-line answer is IBM," says Dyson. "IBM has the best system that gives the maximum reward for the minimum investment. *TopView* is minimal in risk. *Windows* requires too much commitment by the user."

Even Ballmer concedes the edge to *TopView* in the immediate battle, although he believes the real war still lies ahead. "*TopView* does a better job than *Windows* at handling older applications," he notes. "Although *Windows* will run many older applications, it's more oriented to the future."

Industry analyst Curt A. Monash observes, "I don't think any one windowing system will be as dominant as MS-DOS is." He says, "Certainly, *TopView* will be viable for the end user to buy into, but *Windows*, too, is worth considering. At least, it will have Microsoft's own applications running on it, and they are regarded as quite good."

More Bricks (continued)

some form of virtually every conceivable type of data processing or office automation product.

IBM has greatly strengthened the link between the PC and larger office systems by announcing the Office Systems Family. This series of programs moves PCs into the two dominant IBM mainframe-based office environments, the *Distributed Office Support System (DISSOS)* and the *Professional Office System (PROFS)*.

Systems Services

Included in the new software is *DisplayWrite 3* for the PC.

This is an 80286-based workstation that will run, without change, most of IBM's VM/CMS applications programs for mainframes. IBM claims the AT/370 will process System/370 programs from 25 percent to 116 percent faster than the XT/370 can. In addition, a 3278/79 emulation adapter option allows the AT/370 to function as a 3278/79 terminal attached to a host.

Solid Front

IBM also announced two new 3270 PC models that can use the 17-inch, flat-panel plasma display screen. This display panel,



IBM's flat-panel plasma screen works with 5271 system Models 24 or 26.

with all the features of *DisplayWrite 1* and 2, as well as advanced features such as footnoting and outlining. Documents created and edited under *DisplayWrite 3* will be readable by other IBM office systems when the document is transferred using a new communications program called *Personal Services/PC*.

Personal Services/PC enables PC users to exchange files, text, and messages with users of IBM's System/36 or System/370 through the DISSOS/370 network. They communicate with other PCs using asynchronous communication. *PROFS/PC* is an existing program that permits PC users to communicate with systems running under *PROFS*.

On the hardware front, IBM also announced the PC AT/370.

with a resolution of 960 x 768 pixels, now works only with the 5271 system Model 24 or Model 26. With its concurrent viewing capacity of 9,920 characters, it is priced at \$3,695.

The new 3270 models have enhancements that will permit users to send host data directly into spreadsheet or database applications running in the PC-DOS window, eliminating the need to log onto a host computer and convert mainframe files into files usable by PC-DOS.

All in all, the IBM announcements represent just more bricks in the wall: a Big Blue attempt to capture the office automation and data processing markets. It seems clear that IBM intends to leave no gaps in its approach, and for the foreseeable future, its wall looks solid and very, very tall.

Romancing a Clone: GEM's Many Facets

Digital Research's new set of graphics software tools gives PCs a better view.

BY WINN L. ROSCH

PACIFIC GROVE, Calif.—Digital Research hopes to add new sparkle to your PC—and its product line—with its new *GEM*. An acronym for *Graphics Environment Manager*, the new set of software tools can turn the screen of the lowliest PC into a vision of Apple's Macintosh screen, complete with pull-down menus, icons, and mouse control.

With IBM promoting the yet-to-come *TopView* as the official standard for windowing on its personal computer line, and other like products—Microsoft *Windows*, *Desq*, *Visi On*, and Digital Research's own upcoming Concurrent PC-DOS—still trying to best Big Blue, this news may seem to warrant nothing more than pointing your mouse at the trash can and pressing the button.

But you needn't peer through a loupe to see that Digital Research's *GEM* stands out from the others. A variety of on-screen type fonts and sizes reveal that *GEM*, like its Macintosh model, and like Microsoft *Windows*, is graphics-based, while most other PC windowing products use only the PC's text-displaying abilities. However, rather than being able to manage two or more programs simultaneously in one computer, *GEM* is more like a toolkit of routines that programmers can use to create Mac-like application programs for the PC.

Compatibility Claim

In effect, *GEM* becomes an extension of the graphics-handling routines that IBM includes as part of the PC's ROM BIOS (basic input/output system). In add-on applications on existing computers the *GEM* routines will be loaded into RAM (where they become resident, occupy-

ing about 60–80 kilobytes of memory) and get called up by other programs. In future machines, *GEM* can be hardwired into ROM chips.

Digital Research believes that *GEM* will claim a big stake in the PC software marketplace be-

cause it is machine-specific code that must be rewritten and crafted for each model of computer. *GEM* is implemented on, much like the BIOS of CP/M (or MS-DOS) is. The rest of *GEM* is universal, using the same code for the same results regardless of its environment. *GEM* applications call only to the universal part of the software, so they are very transportable—at least among machines for which *GEM* has been implemented.

Tinker Tools

More than just software-compatible, *GEM* is uniquely compatible with computer hardware because it requires little extra

can use it to give menu structure to other programs.

Modest Mechanics

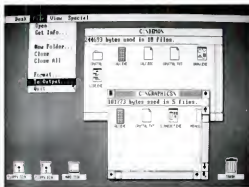
Unlike true windowing programs, *GEM* is not a multitasking system, and its ability to run programs concurrently is limited to the minimal background tasks that work with unadorned DOS.

Although you can "pull down" and run modest applications such as a memo pad or a calculator (for instance, in the demonstration menu system), you can't use *GEM* to make *Symphony*, *WordStar*, *PC-TALK*, and *dBASE III* run simultaneously and slip each other love messages. That's the job of *GEM*'s big (but still gestating) brother, Concurrent PC-DOS (as Digital Research would have it), or of *TopView* and the other windowing systems. According to Digital Research, the *GEM* routines are compatible with all windowing systems.

Availability

Don't expect to find this *GEM* on your dealer's shelves, however. It is not targeted for individual computer owners—at least for now. Instead, Digital Research is targeting hardware OEMs and software developers. In January, Digital Research will start selling *GEM* to software houses wanting to take advantage of this development system for a minimal fee of \$400 to \$500. That's it—no recurring license fees, even though the *GEM* routines may be distributed with the finished software. Digital Research hopes that will tempt developers to get new, *GEM*-based software out on the market and help *GEM* to become a de facto software standard, much like CP/M.

In February, Digital Research will begin marketing *GEM* applications to consumers, including *GEM-Draw*, *GEM-WordChart* and *GEM-Graph*. But Digital Research's pot of gold will be writing and licensing custom versions of the BIOS-like machine-specific part of *GEM* for hardware manufacturers. According to Digital Research, the customers are already lining up. ■



A sample screen showing GEM's use of icons, windows, and pull-down menus.

cause it is uniquely compatible: Any program that runs under DOS should work with *GEM* without modification. There's no need to run out and buy new, updated versions of your favorite software just to use *GEM*.

However, don't expect to blow the dust off your favorite antique software package and expect *GEM* to give it state-of-the-art windowing abilities. Although *GEM*'s routines makes adding windows easy for programmers, they do not automatically confer windowing abilities on existing programs.

GEM's underlying structure makes programs with Mac-like graphics easy to translate to a variety of different computer systems. *GEM* is constructed like DOS—or, more to the point, like Digital Research's own CP/M operating system. Part of *GEM*, about 25 percent,

memory to operate. While true windowing systems start by chewing up a 256K chunk of memory and sometimes swallow 5 megabytes of hard disk just to get started, *GEM* can operate on systems as small as 128K—which includes the PCjr and lightweight compatibles.

The pull-down menu display that Digital Research has shown the world—a demonstration program that doesn't do much more than show what the real *GEM* can do—is only a small facet of the whole *GEM*.

The menus operate as a shell or "front end" to DOS (in the familiar desktop metaphor form), so that, rather than typing in some cabalistic DOS incantation, you need only point to a command to carry it out. Programmers can use the *GEM* toolkit to write any number of similar shells for DOS, or they

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News In Brief

Thought Into Your Computer. Thoughtware, Inc., has introduced a business application software package to help managers improve business performance, pinpoint problems, and take necessary action to remedy the problems. With *Trigger*, managers can monitor activities that contribute to their companies' profits.

The *Trigger* package includes a three-program application disk, a tutorial, and a reference manual. A Thoughtware management training program is also included in the package. The cost of the whole package for the IBM PC, PC-XT, or compatible is \$495.

Jack Levine, president of Thoughtware, says that *Trigger* is like having a "full-time management consultant in your PC." Each company can tailor *Trigger* to suit its own needs. A manager decides which elements affect the company's profitability and performance and then inputs the data concerning those factors into the program. *Trigger* then monitors the data, analyzes the results, identifies trouble spots in the organization, and generates reports, memos, and graphs to be distributed to people involved in the troubled area.

More information can be obtained from Thoughtware, 2699 S. Bayshore Dr., Coconut Grove, FL 33133, (305) 854-2318, (800) 848-9273.

New Floppies. The Eastman Kodak Company has expanded its participation in the electronic media market by announcing plans to expand its production of 8-inch, 5¼-inch, and 3½-inch disks. The disk will be available in single- and double-sided versions.

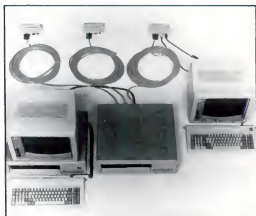
Kodak also announced plans to form a new manufacturing division, the **Electronic Media Manufacturing Division**. The company will coat and prefinish the magnetic media for the floppies in a plant near the company's headquarters in Rochester, New York. The finishing and formatting of the disks will take place in **Guadalupe, Mexico** (near its already-existing photographic plant), where labor costs are much lower than those in the United States.

Full production of Kodak floppy disks is not expected until 1985.



In the interim, Kodak will purchase disks from other manufacturers and sell them under Kodak's name.

For Kodak to be successful in an already competitive market, it will have to sell its disks at a low price. Kodak is relying on its reputation in the photography market and will market under existing sales and marketing channels. Eventually, Kodak will sell its disks in computer stores, retail stores, and through mass merchants.



A four-user Anex system showing two of the workstations. The IBM computer is on the right. The Anex expansion chassis is on the left of the PC.

Anex Announces Multi-PC. Anex Technology, Inc., has announced an expansion chassis that lets four users run different applications on a single IBM PC. *Multi-PC* is an 8-slot board that plugs into the IBM PC or XT and turns it into the operational equivalent of four separate PCs.

The basic configuration costs \$1,495 with Multi-DOS, a user-transparent, multi-user PC-DOS, a 130-watt power supply, and cables and connectors for one additional user. Two more workstation adapters may be added for \$300 each. Each PC user must also have an IBM-compatible monochrome or color display adapter, keyboard, and display. Each user may be up to 1,000 feet away from the PC.

The Anex approach lets users run any existing PC software, including packages with bit-mapped graphics and screen addressing. Only one copy of each application is required because *Multi-PC* uses a single CPU. Anex officials claim it is the only multi-user PC system with these features.

"We've taken a step 10 years backwards to use a tried and true minicomputer technology," Dennis Murray, Anex vice president for marketing told a New York news conference. "And," he said, "it works. We're providing IBM's promised AT technology to PC users now."

Multi-PC designer and Anex president Alan Goldman likened the Multi-DOS software to Digital Equipment Corporation's RSTS/E multi-user DOS in its user service. Anex offers a RAM board with up to 2 megabytes of memory. Other options include Multi-Spool, a 64K RAM board with its own processor, and Multi-Lock, software for minicomputer-type log-ons with password protection and file security. With *Multi-Lock*, programmers can install individual record locks. The expansion chassis supports two additional floppy or hard disk drives with an optional controller.

"Why is IBM so interested in Local Area Networks (LANs)?" Goldman asked his news conference audience. "They want to sell more PCs. Our approach is a cost-effective alternative to multiple PCs."

Goldman promises an eight-user version of *Multi-PC* for the PC AT, and says the company's "next major product" will be an IBM PC Net interface for the four-user *Multi-PC*.

—compiled by Tam Badgett, Charles Berman, and Jane Mintzer



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Tecmar Arranging PC Compositions

Ohio firm developing advanced music synthesizer for PC family

BY WINN L. ROSCH

CLEVELAND—I softly padded out of the Tecmar design and development department. Strange laughter radiated from one of the many cubicles. Totally unexpected, it was not the high-pitched, hysterical laugh engineers often let loose after 48 hours of staring at green screens nonstop, valiantly trying to keep promises made by the marketing department. Rather, the laughter recalled genuine enjoyment.

I poked my nose toward the point of origin and detected the weird alliance of two engineers, one PC with a rat's nest of wire wrap overflowing it, and a pianolike keyboard. Besides the laughter, the tiny roomette was filled with a Bachiana of organlike chords (later revealed to be a Walter Piston keyboard exercise) and nonmusical notes akin to a random splicing of indigestion gurglings and Hal-loween aboard the *Starship Enterprise*. The root of the merriment was an up-and-coming Tecmar product in an entirely new area for the business- and laboratory-oriented company—a music synthesizer.

As you might expect, the new Tecmar machine won't be an ordinary music synthesizer. (Is there any such thing as an ordinary music synthesizer?) Rather than a piano keyboard and more loose wire than spaghetti at an Italian family reunion, the Tecmar device will be a single expansion card designed to slide inside a PC, XT, or an AT bundled with the software to control it.

High Tech Hi-Fi

The novel design stretches well beyond the music industry norm; the synthesizer is com-



pletely stereo and totally digital. You can connect it to nearly any electronic instrument with a MIDI (musical instrument digital interface) as well as to any stereo or musical instrument amplifier. Best of all, the basic instrument will be priced under \$1,000 when it becomes available at year's end.

As I chatted with the designers, I found that one of their design goals had been to make a product several notches above the Mountain Computer music synthesizer, a de facto industry standard for the Apple II. The more I talked, the more apparent it became that the Tecmar engineers considered their creation more a labor of love and a matter of pride than a new product. (Most of the design team seems as adept at keyboarding music as they are at programming commands.) Instead of simply describing the unit, they boasted of its virtues, played on it, painted waveforms and envelopes in a PC monitor, and created sounds never before heard this side of sobriety.

According to Andy Wolpert, who is writing the software for the system (Dave Keene is handling the hardware engineering), "It's a unique digital synthesizer. Although it has some of the capabilities of a Synclavier—in terms of software, its recording ability, and command language—overall, it's superior to the synthesizers now on the market. You can control 16 different timbres occurring at one time with it; no other synthesizer, except for a really expanded Oberheim, can do that."

Sound Barriers

Wolpert's control software extends the 16-voice ability to 64 by taking simultaneous command of four cards. Because the data in all those voices amount to more bytes than a mere PC can digest, he looks forward to connecting his personal synthesizer to an AT.

As Wolpert explains it, each voice will have a range roughly between direct current (0 hertz) and the limit of the hearing of dogs, based on a digital sampling frequency of 50 kilohertz. Absolute pitch accuracy will be to one-twentieth of a hertz. Voices are defined by 64 tables (expandable to 256), each made up from 1,000 entries (which essentially define points on a waveform), each entry of which will have 12-bit digital accuracy.

Unlike other synthesizers, the Tecmar design calls for each output waveform to be a combination of two waveform tables (rather than one) at any point in time, a feature that saves on the number of voices needed to create a given sound. According to Wolpert, "Each voice can use combinations of waveforms defined in memory; so you don't need multiple voices to do dynamic spectral variation. You can dynamically vary harmonic content with a single voice."

Musical Combo

Communications with other synthesizers or instruments will be by standard MIDI, and so any MIDI-equipped device can be connected. Input can be from another synthesizer, keyboard, guitar, or whatever. Tecmar plans to offer a MIDI keyboard

either as an option or as standard with some models.

The command language Wolpert is working on can be used to compose or record performances for later editing. It will capture incoming MIDI data—digital code representing musical events like the on-and-off times of each note and how hard each key is hit—either from live performances on instruments or as non-real-time data entry. Although the final version of the screen displays and the programming commands has not been finished, the developmental version of the software I saw relied heavily on a graphic presentation of musical parameters. Although similar in structure to other synthesizer languages, the Tecmar musical programming language is being developed just for this project and will be subject to ongoing development.

The system can convert the live or recorded information into a composition that you can replay or alter by redefining the instrument sounds. You can change instrumentation and even define your own computer instruments within system.

Keyboard Exercise

Promised features of the completed system include the ability to play polyphonic music on the PC keyboard (in a minimal system) or from up to 16 external MIDI-equipped sources. Anything played on either the PC keyboard or any of the MIDI sources can be recorded into RAM memory and saved in disk files for later use and editing. You can manipulate the recorded performances further as they are played back.

The final output can be either analog, for direct sounding of a variety of musical instrument sounds through amplifier/speaker combinations, or digital, through the MIDI interface, which can then be connected to any external MIDI-equipped synthesizers and computers. The system's stereo abilities allow any voice, or any single voice pitch, to be panned anywhere between the two speakers.

The only thing that seems to be lacking is a name. ■

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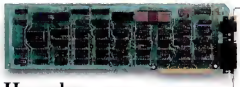
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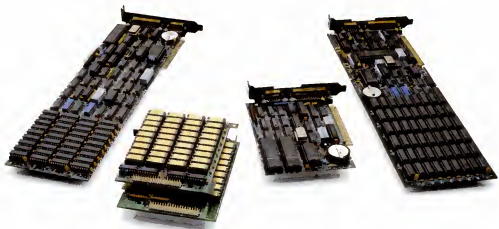
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CIRCLE 159 ON READER SERVICE CARD

IBM Joins Infomart's Endless Computer Show

Market centers in several cities integrate information industry under one roof.

BY MARTIN PORTER

DALLAS—The information industry's first major market center will open early next year in Dallas, and observers expect that the participation of IBM and its competitors will help promote similar centers throughout the country.

Infomart will open its doors on January 21, 1985, as the latest addition to the 175-acre Dallas Market Center built by billionaire real estate developer Trammel Crow. The seven-story structure is modeled after the Crystal Palace, the imposing hall built of glass and cast iron for London's Great Exhibition in 1851. It will serve as a year-round trade show for all levels of the information processing industry.

Optimistic Outlook

Other developers plan to open similar, though less elaborate, market centers over the next two years in Boston, San Francisco, and Atlanta. Crow is also part of a consortium building a 2.4 million square foot merchandising mart in New York City as part of the Times Square renovation. The facility, scheduled to open in 1987, will devote 18 floors to computer and communications products. So far, IBM has made extensive floorspace commitments at only Infomart and the Boston Computer and Communications Marketcenter (BOSCOM) in downtown Boston.

"Marts help limit the cost of marketing," explains Thomas Goode, director of marketing and sales for California Data-Mart, a 625,000 square foot market opening in San Francisco. "The vendors don't have to increase their sales force or their advertising budget; they can let our program bring customers to them."

Goode, who reports a healthy 20 percent pre-lease rate 9 months before opening. "It appears the whole industry has bought the concept."

Though IBM has not yet signed in San Francisco, Goode believes its lease in Dallas represents its endorsement of the market strategy and that IBM will rent display space at the other marts as well.



An architect's model shows the soon-to-open Dallas Infomart.

The centralized trade mart took some time to catch on in computer circles. The opening of BOSCOM was delayed from the summer of 1984 to next summer after the developer's first announcement failed to draw renters. By now the tide has turned, and BOSCOM has leased 60 percent of its display space.

Some analysts feel that IBM's commitment helped make the difference, while others perceive the development as an inevitable industry-wide move. Says DataMart's Thomas

Infomart's floor space rents at \$24 to \$33 per square foot. IBM is the facility's largest tenant, with a 4-year lease for 23,000 square feet, which will be used to show a full range of its micro, mini, mainframe, and software products. Other Infomart lessees include AT&T, Xerox, Tandy, and Texas Instruments.

Enhancing Sales

Some feel that the market center strategy fills an industry-wide need. "Direct sales reps don't easily reach small and medium companies, and retail

stores reach a market that's already knowledgeable about the technology," says Goode.

Still, there remain some in the industry who are skeptical of the trade mart scheme. Apple Computer, for instance, has decided to direct its marketing toward broadcast advertising rather than market center displays. And some manufacturers may opt for a consumer-oriented, high-tech shopping mall, such as Miami's Future Works, which opened in mid-October.

According to Marlan Stredwick, Infomart's manager of marketing communications, "We are not in business to compete with retailers." However, he says, that doesn't mean purchases are prohibited. Customers can place orders at Infomart, but delivery must be fulfilled elsewhere.

Developers seem confident that the market center devoted primarily to display, demonstration, and training has tremendous buyer appeal. Surveys conducted by BOSCOM found that up to 80 percent of top industry buyers say they would visit an information industry market center of this type. The overall appeal is that visitors can see the entire breadth of the industry under one roof—much more than what IBM alone has to offer. As a result, some analysts feel, IBM may have no choice but to lease market space across the board.

Infomart, a 13-floor computer market planned for Atlanta by world-renowned architect John Portman, has yet to receive a lease agreement from IBM, but salespeople have held extensive talks with the company and are optimistic about Big Blue's presence.

Explains Infomart vice-president Michael Fleming, "The major vendors are extremely interested in this kind of concept. The interest level has been high across the spectrum."

However, none of the markets surveyed indicated that computer manufacturers have bankrolled any of the development funds. Most are privately held and family owned. Fleming adds, "John Portman doesn't need IBM to help him build a mart."

The Price Is Right

BOCA RATON, Fla.—A \$500 price reduction for the PC-XT has led to an across-the-board "promotional" price cut for most of IBM's hardware line.

The cuts are being offered to dealers on a volume basis, and will be passed on to consumers at the dealers' discretion. Other price decreases include \$100 for the PC; \$250 for the PCjr; \$300 for the 3270 PC; \$300 for the PC Portable; and \$174 for the \$152 Graphics Printer.

The price slashes are effective immediately, and in order for either dealers or consumers to take advantage of them, they must take delivery before February 1. IBM gave no word as to what prices would be after the promotion ends.

An IBM spokesperson declined to comment about the cuts, citing the "confidential agreement" between the company and its dealers.

—Charles Berman

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11 DISCOUNT BOOK LIBRARY—Working with numerous publishers and distributors, The NETWORK has assembled a library of over 1000 computer related books and manuals at savings of up to 75% from the normal store price.

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13 CORPORATE ACCOUNT PROGRAM—Almost 50% of The NETWORK's members are corporate buyers and users (see opposite page left). The NETWORK can establish open account status and assign designated account managers to expedite orders, and coordinate multiple location shipments.

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Aunt Jemima, Morris, and the Tramp Make One "Computerrific" Team

Coupons, drawings, and giveaways are just some of the surprising ways IBM personal computers are being hyped and hawked.

BY STEPHEN MANES

"You may have already won a personal computer in the computerrific sweepstakes," screams the back of Carol Wright's October letter, fairly brimming with "special coupon savings inside." What member of the huge, far-flung Resident clan can resist such a tantalizing offer? I rip open the envelope with such abandon, I nearly splash a sample of Dawn Dishwashing Liquid all over my bowling shirt.

Miles of Aisles

My own official Computerrific Sweepstakes Number is presented by line products from Procter & Gamble Co. The 250 grand prizes of IBM PC systems and 750 first-prize PCs systems are waiting. The display in "any participating grocery, drug, discount store, IBM Product Center, or authorized IBM dealer" lists the winning numbers. Sounds easy, right?

Well, supermarket assistant

manager Cha-Cha looks up from her nail file, scowls at me, and says, "Maybe in the drug aisle." But there's no display in the drug aisle. Or the soap aisle.

My sage pharmacist pre-

fancy graphics monitor." He doesn't have the official display, but he does have a special on Atari game cartridges.

The kid in the discount store tells me he can make his VIC-20

Cleaning up With Junior

Those who can find a Computerrific Sweepstakes display may want to check out an offer for a certificate worth \$100 towards the purchase of an IBM PCjr. Mail in just 25 proofs of purchase from participating Procter & Gamble brands, and the discount is yours.

A special I-2-3 model prepared for PC by a consultant showed that brushing with Crest after every meal, taking three baths a day with Coast, and washing underclothes with Tide every evening leaves an individual user about 15 purchase proofs short by the December 1 deadline. Drinking copious quantities of a 50-50 mixture of Citrus Hill and Scope was determined to be one cost-effective strategy. Adopting a large family was not.

"Shouldn't your first computer be from IBM?" asks the ad copy. "Sure," says our consultant, raising his hands, "but not if you have to use Sure 18 times a day to get one." —S.M.

scribes a different computer lottery: the state-operated one for which he has a terminal. "Win \$2 million after taxes, and you can afford an AT—even with the

do anything a PC can do and wonders if I know anybody who's looking for 6502 assembly-language programmers. No display.

I can just imagine the response from an IBM Product Center Customer Representative: "Yes, sir, I believe we have that information posted on one of our dumpsters."

Waste Not

That leaves my Authorized IBM Dealer, just a long-distance phone call away. She's never heard of the promotion, but offers me a terrific discount on CP/M-86.

If I send a stamped, self-addressed envelope to Blair, Neb., for a list of the winning numbers, they'll probably just steal the stamps. So it's up to you, readers. If you run across the display, check out number 85926317 for me. If I win, I'll give you my extra copy of DOS 2.1.

Tinselware Arrives

Thanks to *Greetingware*, Santa won't be the only one booting up for Christmas. You can send your IBM PC-owning friends and relatives this Christmas-card-on-a-disk, which displays its cheerful screens in a veritable Christmas tree of bright, glowing colors or in a seasonal green on a monochrome system. *Greetingware* lets the PC play several Christmas carols, displaying the lyrics while a cursor bounces from word to word in time with the tune.

Its makers claim that *Greetingware* will run on any system that is "100 percent compatible with the IBM PC family of computers," but, because the program calls for IBM's BASIC by name, you'll have to do some tinkering with the disk to run it on even the most compatible non-IBM system. Of course, this won't be as much trouble as assembling a bicycle with instructions in Korean or shopping for batteries at 2 a.m. on the night before Christmas.

Greetingware is available from Roxbury Research Inc., RDI Box 171A, Roxbury, NY 12474, (800) DIALROX. By mail order, it costs \$14.95, and you can include personalized messages on the screens for an additional \$3.00. "Oh come, all ye floppies..."

—James Langdell



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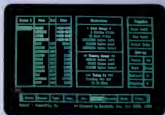
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Idirfully Easy with the popular Idir menu driven "visual shell" software. It replaces complicated DOS commands with menus that allow you to just point at what you want to do. Help files explain DOS commands and give you on-line advice when you need it. Idir takes the wonder out of the tree structured subdirectories so useful in organizing a hard disk.

Hard Problems like excessive current draw and heat have until now been unsolved problems with aftermarket hard disks. Most drives draw lots of power. If your PC has many expansion boards in it, power to run a hard disk is probably not available. Hard disks have also been easily damaged by vibration and movement. And of course the problem any non-IBM product must face, compatibility with the IBM PC. We have tackled all these problems and come up with the best solutions available at any price.

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Total Compatibility is a necessity. Our hard disks have the ability to boot directly from the hard disk. Check around, very few aftermarket systems can. In fact, all you need is a copy of DOS 2.0 or 2.1 and you are ready to go. No software drivers to install, or DEBUG patches to apply.

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PC10: Includes 10 Megabyte drive, controller, cables, installation instructions, Idir software, and 1 year warranty. **\$794**

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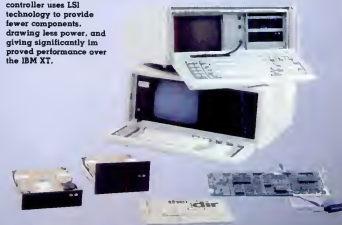
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WHY DEBUG YOUR PROGRAM IN ASSEMBLY LANGUAGE WHEN YOU WROTE IT IN ONE OF THESE...

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Without source level debugging, the programmer must spend time mentally making translations between assembly language and the C, PASCAL, or FORTRAN source code in which the program was written. These tedious translations burn up valuable time which should be spent making critical product schedules. The low level hex and symbolic debuggers available today are superseded by ATRON'S solution — Source Probe.

HOW TO SINGLE STEP YOUR SOURCE CODE AND VIEW CRITICAL DATA IN VIEW

With Source Probe, you can step your program by source code statements. While stepping, a window which you define can display critical high level data structures in your program. The next several source code statements are also displayed to give you a preview of what the program will do.

HOW TO DISPLAY DATA IN MEANINGFUL FORMATS

Why look at program data in hex when you defined it to be another data type in your program. Source Probe provides a formatted print statement to make the display of your variables look like something you would recognize. You can specify data symbolically too.

FIND A BUG — FIX IT RIGHT NOW

Source Probe provides an on-line text editor to allow you to log program corrections as you find them while debugging. With on-line display and editing of source files, the time lost printing and looking through program listings can be eliminated.



A SNAP SHOT OF REAL TIME PROGRAM EXECUTION — BY SOURCE CODE !

When Source Probe is running on ATRON'S PC PROBE hardware, the real time execution of the program is saved. You can then view your source code as it executed in real time — including all the changes the program made to your data variables.

HOW TO FIND A BUG WHICH OVERWRITES MEMORY

When running on PC PROBE, the Source Probe can trap a bug which overwrites a memory location. Because complex pointers are normally used in high level language programming, this bug occurs frequently and is very difficult to find.

A BULLET PROOF DEBUGGER

What good is a debugger that can be wiped out by an undebugged program? With Source Probe running on PC PROBE, the software is write protected and cannot be changed.

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From Tubes to Terminals: Monitoring the Market

Television manufacturers have set their sights on the future—home computing.

BY MARTIN PORTER



NEW YORK—The IBM PC-compatible of the future may look much like a home television than the microprocessor box of today. Several of IBM's competitors are already plotting a home computer of tomorrow in which the monitor may be the centerpiece, rather than just the display, of the CPU configuration.

At a recent computer-industry seminar entitled "Home '84," Future Computing vice president Tricia Parks predicted, "I don't think we've seen the last of entries in the home computer market. There'll be more manufacturers than just IBM, Apple, Commodore, and Atari. A likely place to look for future entries is television manufacturers."

Such prognosticating shouldn't surprise observers of the IBM PC and compatibles market. IBM PC-compatible manufacturers Zenith and Panasonic were well entrenched in the television market before they considered making desk-top microprocessors. Motorola, another clone-meister, was a TV-

industry leader until it sold the Quasar line to Matsushita in the 1970s. RCA's computer history dates back to an unsuccessful attempt to unseat IBM in the mainframe category in the 1960s. Sony makes computers of its own and manufactures the 3½-inch disk drive used in Data General and Hewlett-Packard PC-compatibles. Well known for its line of PC-compatible Spinwriter printers, NEC also makes high-tech RGB/composite monitors.

Fine Tuning

Furthermore, a close look at innovations in the television market shows that the TV manufacturers, aware of personal computer developments, are adapting their products for PC-compatibility.

Zenith, the manufacturer of the PC-compatible Z-150, isn't predicting future microcomputer-televisions, but a Zenith spokesman foresees a market for them.

"Statistics show that every home in America has a television set. The number of homes that have computers is at best 10 or 12 percent. Since there are more 'monitors' out there than computers, obviously the television set can be the driving force in home computing, rather than the other way around," explains Scott Hauter, director of interactive television marketing at Zenith.

Some analysts maintain that the next step will be for a TV manufacturer to build the microprocessor into the TV circuitry and expand remote controls to full QWERTY keyboards.

"A variety of things could happen," Parks predicts. "The computer power can be delivered on a particular channel, or

the computer could be yet another component like a VCR."

The futurists at Panasonic, manufacturer of the PC-compatible portable Senior Partner, have their own theories. According to Jerry Surprise, national product manager for Panasonic television, his company has no immediate plans for such a product, though it would be a logical future entry.

He predicts that a Panasonic computer television is "5 years down the road," though he wouldn't say whether the machine will be MS-DOS compatible. Besides its MS-DOS connection, Panasonic's parent, Matsushita, is already heavily promoting the MSX home standard in Japan.

Surprise and Hauter of Zenith agree that the merging of the two technologies will occur when

the market accepts videotex. IBM announced last year that it has entered videotex in a joint venture with Sears and CBS. However, consumers' acceptance of videotex isn't clear, and this lag could slow production of a computer/TV hybrid product, say the two experts.

"The consumer hasn't responded to videotex although it has been heralded by the engineering/information community. Once it is accepted, though, I can foresee the merger of the two technologies into one product," says Surprise.

Surprise says PC compatibility will of course remain a priority for the television of tomorrow.

Says Hauter, "You can't afford to ignore the popularity of the IBM standard regardless of your product." ■

Extra on Textra: Price Cuts, Free Samples

BY CHARLES BERMANT

ANN ARBOR, Mich.—Failure to achieve sales and distribution goals has caused a small software company here to almost halve its program's retail price and attempt other bold marketing moves.

Ann Arbor Software has announced that *Textra*, which has been selling for \$95 since June 1983, will bear a new list price of \$49.95. In addition, the company will distribute a limited "freeware" version of the program for a small handling fee.

Company president Scott Anderson says that the moves are designed to provide a low-cost, high-performance alternative in the word processing market.

"Shelf space is the holy grail in this business," says Anderson. "We've had two things work against us. We are a single-product company with a low price. For those reasons, most dealers are not motivated to stock us. Most dealers will carry a maximum of ten word processors, and four or five of those are given, like *WordStar*."

Anderson says that 300 dealers around the country carry

Textra, but Ann Arbor Software had hoped for ten times that number. In addition, he said, the small company has "taken a bath" with its PCjr version, spending a great deal of money on advertising and selling only 500 copies of the program.

Un-Fortune 500

As a "low-overhead company," Anderson says, Ann Arbor can afford to market *Textra* for \$49. And although several copies of the program will be sold in its current binder package, the lower price necessitates redesigning it into a paperback book format. In addition, several on-disk updates will be sent to users each year.

As for "perceived value," the notion that an inexpensive product can't be worth much, Anderson says it affects "only the most naive consumer."

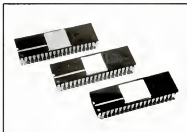
To receive the "Use It or Refuse It" edition of *Textra*, a fully workable, but slowed-down version of the \$49 package, send \$5 for handling to Ann Arbor Software, 407 N. Main, Ann Arbor, MI 48104. ■

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PRODUCT REVIEW

Different Strokes

Three printing programs squeeze more typefaces out of dot matrix printers.

BY JAMES LANGDELL

NicePrint

Spies Laboratories
P.O. Box 336
Lawndale, CA 90260
(213) 538-8166
List Price: \$95

Requires: At least 27K RAM more than is required to run a word processor, any version of DOS (works with IBM Graphics Printer; Epson RX- and FX-series printers and Epson MX-series printers with Graftrax-Plus; Gemini 10- and 15-series printers; Okidata 92 and 93 with Plug'n Play).

NicePrint will probably work smoothly with any type of word processing software you already use; in fact, it's immediately compatible with such programs as *WordStar*, *Multimate*, and *Lotus's 1-2-3*. Its special typefaces also enhance any text printed by pressing **Print**.

As soon as you load it, *NicePrint* causes your dot matrix printer to use a typeface that is close to letter quality. For access to this primary function, *NicePrint* sets a new standard for ease of use: The first 20 words on the manual's "Simple Instructions" card really do tell you everything you need to know.

Of course, *NicePrint* can do a lot more. And the additional functions are easy to learn, so each can be used immediately—you don't have to understand everything before doing anything.

After you know all about *NicePrint*, you can call for six font styles, including Roman, Sans Serif, Orator, Script, Olde English, and Computer. In any permutation of these characteristics: big (double height), large (double width), italic, super- and subscript, bold, enhanced or ordinary mode, and pica,

elite, or condensed pich. You can also control printer operations, such as form feeds, from the keyboard.

Any of these specifications can be called for in real time by pressing command keys involving the **Ctrl-Alt** combination.

Compliant Commands

Equivalent *NicePrint* commands can also be entered in

ated using the program, is well presented. It concludes with a long catalog showing full character sets for every possible style of output, plus the commands that produce each.

Time Bandit

While you reap its benefits, *NicePrint* exacts a stiff price in time. The IBM Graphics Printer and *WordStar* normally take 40 seconds to print a draft-quality page of double-spaced text, but they needed 3 minutes to print the same page with *NicePrint*'s higher quality font. The time is proportionally longer when you ask *NicePrint* to make larger characters: The same text took 6 minutes to print as double-height characters.

There seems to be no additional delay for switching between different characteristics

own terms, it offers capabilities that should cure PC owners of the envy they might feel toward those who play with *MacPrint*.

Fontrix gives "font" a very broad definition: one that encompasses foreign language alphabets (including Hebrew and Sanskrit), mathematical symbols, border designs, musical notation, architectural and electronic symbols, and miscellaneous icons and shrubbery (if you don't believe the latter, see the "Leaves" font in *Fontrix Volume 3*). The program is compatible with a wide range of printers.

Text in an existing ASCII file can be fed character-by-character onto a *Fontrix* screen; you can change the symbols' font, size, and color as they arrive. But after text appears on the screen, you'll find it easier to

Normal print
Enhanced Pica
Enhanced Elite
Enhanced Condensed
Pica Sans Serif
Pica Orator
Pica Script
Pica Olde English
Pica Computer

Elite Sans Serif
Elite Sans Serif Large
Elite Sans Serif Big
Elite Sans Serif
-- Big & Large
Big & Large Computer
Olde English, Ditta

A sampling of body and headline type produced by the *NicePrint* program on an IBM Graphics Printer

DOS from the command line or in a batch file. To call for a wide variety of effects in the same document, the best method is to embed *NicePrint*'s commands in your text file. The embedded commands all begin with the rarely used backslash character; *NicePrint*'s words complement your word processor's present formatting and escape code processes.

In most cases, you don't have to modify your text files before using *NicePrint*. However, this program won't automatically rebreak lines to accommodate your page width. If you ask for double-width characters, your text must be edited in a 40-character format. If a line is too long, you get no warning that the excess characters will be overstruck, thus making a blot at the right side of the page.

The manual, which was cre-

ated within the same document; text within a line changed from Olde English to Computer font without skipping a beat. And *NicePrint*'s typeset looks better and bolder than you'd expect from a dot matrix printer. These results are worth the wait.

Fontrix

Data Transforms Inc.
616 Washington St., #106
Denver, CO 80203
(303) 832-1501

List Price: \$125; *Fontrix* character set disks, \$20 each.
Requires: 256K RAM, DOS 2.0, IBM or Paradise graphics display boards, (works with over 12 makes of parallel and serial dot-matrix printers).

Fontrix is more complicated than *NicePrint* and isn't as accommodating to other word processors. However, on its

handle in terms of transforming, moving, and deleting graphics areas rather editing a stream of running text. Unlike word processors, *Fontrix* doesn't automatically rebreak text at the end of lines.

The most difficult part of designing with *Fontrix* is conceiving of the dimensions of a Graffiti, which can extend far beyond the borders of your computer's screen. The Graffiti can be printed out as a whole—assuming you make its proportions fit your printer's paper size—or one screen at a time.

Power Plays

The easiest way to learn *Fontrix* is to set aside the power of Graffiti at first and make designs that can fit on a single screen; this way you can be guided by the old maxim, "what (continued on next page)"

Different Strokes (continued)

you see is what you get." When you print out one of these screens (this is easy to do since the built-in default values can be trusted to produce recognizable—if not optimum—results), you'll be surprised at how little space the image fills on the page compared to its size on the screen. By modifying the printing characteristics, which are clearly presented in a menu, you can modify your image's vertical and horizontal dimensions,

Select-A-Font
by Robert Oesterlin
IBM Personally Developed Software
P.O. Box 3280
Wallingford, CT 06494
(800) IBM-PCSW

List Price: \$19.95
Requires: 128K RAM, DOS 1.1 or later, IBM Graphics Printer or equivalent.

Unlike most of the inexpensive programs in IBM's Personally

a machine that can output 243 typefaces—permutations of nine type styles, three sizes, and nine widths. This will only work with pure ASCII text files with proper carriage returns at the end of each line. You must print the text by loading its file into the *Select-A-Font* program; you can't access the extra typefaces through your regular word processor's printing routines.

You select typefaces and other printing characteristics, including right, left, and center

program's commands, you must replace any ambiguous periods in the text, such as the one in the expression \$19.95, with more unusual symbols, such as the tilde or ampersand, which the program converts back into periods at the time of printing.

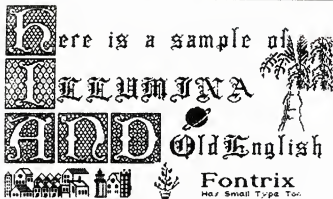
Select-A-Font is less forgiving than *WordStar* when it encounters stray periods; it stops to print a lengthy syntax error message on these occasions. Why couldn't this utility have used a symbol less common than the period to set off its commands in the first place?

Dirty Details

This program's 22-page manual, which the user must print out from the program disk, isn't formatted by *Select-A-Font* itself. Therefore, you don't see any illustrations of the end results for the commands you read about. Also, borders and other formatting details in the manual's text are incorrect unless you use an official IBM printer. Even with a lookalike Epson MX-80 printer, ruled borders around the text appear as rows of unexpected characters.

The one built-in sample of *Select-A-Font*'s work is a two-page advertisement, which takes 14 minutes to print out on an IBM Graphics Printer. This includes examples of all nine type styles in display sizes. The fonts provided by *Select-A-Font* aren't as solid and clear as those produced by *NicePrint*. This program's designer might believe that the linework within characters is a sign of finesse; however, this sort of detailing merely makes the type look scratchy.

One further warning: IBM's catalog of Personally Developed Software claims *Select-A-Font* lets you "change size on any line" and shows an example of this capability. But the program's manual points out that you can't change the size—only the width—of characters on the same line. The broadside on the sample disk file also says "Change size on ANY Line" but yields to the program's reality by breaking this sentence into two lines, each with a different size of type. This sort of deception might give \$19.95 software a bad name.



The single-screen graphic, shown above, illustrates the work that can be produced by Fontrix on an Okidata 2400.

and then you should soon get a feel for typography and topography within *Fontrix*.

As you get more experience, you can combine a great variety of images in large Grafflines and even create your own fonts. Twelve fonts are supplied with the basic *Fontrix* package. More are available in *Fontpaks*, sold for \$20, with 10 or more new fonts on each disk.

The manual is large but is also very clear and entertaining. The first half is a tutorial, which guides you through projects, such as designing a party invitation with a map to your house (the manual even prompts you to buy refreshments and suggests that you invite the program's authors). This is one of the rare tutorials that doesn't just feed you canned examples keystroke by keystroke; it requires you to create something of your own but also guides you enough so that what you choose to do is possible.

Developed Software series. *Select-A-Font* confirms my worst suspicions about software that sells for \$19.95.

This program claims it will transform an IBM Graphics Printer, or its equivalent, into

justification, by embedding *Select-A-Font*'s command codes in your text file. These commands begin with a period; for example, .fn9 calls for the Gothic English font. Since the period character is preempted for this

Simplex Roman
Duplex Roman
Triplex Roman
Complex Roman
Simplex Script
Complex Script
Triplex Italic
Complex Italic
Gothic English

Type fonts produced by *Select-A-Font* on an IBM Graphics Printer.

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BOOK REVIEW

Thief of Arts

A program called *Racter* challenges the traditional notions of writing.

BY TERRY NASTA

The Policeman's Beard Is Half Constructed

Racter
Warner Software/Warner Books
666 Fifth Ave.
New York, NY 10103
(212) 484-2900
Copyright: 1984
Cover Price: \$9.95
ISBN: 0-446-38051-2

Traditionalists in the poetry world argue about the validity of free-form verse. It's not true poetry, they complain, because there's no meter. Well, now that a computer program has become a published poet, the pundits will really have something to shake their heads about.

The program in question is called *Racter*. The product of the devilish program's musings is *The Policeman's Beard Is Half Constructed*, a new paperback from Warner Books. Discreet human intervention was provided by William Chamberlain, the brains behind the beard. Chamberlain co-

authored the prose-synthesis program that resulted in the book, and is a prolific writer himself.

In a brief introduction, he explains that *Racter's* random selection of words follow, an approximation of English grammar. Like *Elixa*, the famous tongue-in-cheek self-analysis program, *Racter* dutifully combines a noun and a verb with an adjective or two and adds a period at the end, producing a respectable sentence.

Queen's English

But where *Elixa* is rough around the edges, mistaking an occasional pronoun, *Racter* is a flawless grammarian. It conjugates regular and irregular verbs, conjures up the singular and plural forms of regular and irregular nouns, and remembers genders, getting the pronoun right every time. It can assign variable status to words, sentence forms, paragraph structures, or even whole story



forms. Choosing from an impressive 2,800-word vocabulary, *Racter* observes "syntax directives" that derive from the way the words have been categorized. These rules allow it to compose pieces that are not only grammatically and syntactically correct, but often pleasing and even eloquent.

Chamberlain's comments on his programming methodology are sketchy, but this was probably intentional. Kept from the details, you can almost believe that the techno-prose and poetry of *The Policeman's Beard* came from real insight.

Editorial Mix

The book mixes short poems, dialogues, limericks, simple declarative statements, and several running scenes. Some of the pieces are surprising for their frankness. For example:

It is now... Watch! Carlos's struggles incite Jill; Carlos and Jill feel one another. Critical perpetual conversations indicate passion

or anger, nevertheless Carlos fortunately embarrasses himself in expectant thinking about love...

But *Racter* can also be reflective, as here:

Blissful quiet, the rocking of a recent love is both repose and anguish in my fainting dreams.

And *Racter's* characters exhibit some curious behavior patterns. Throughout the book, characters "yodel" instead of speak, "bolt" instead of eat, and "sashay" or "saunter" instead of walk. *Racter* also shows a predilection for vegetables of different varieties, invoking unlikely images of lettuce, tomatoes, and potatoes amid the bantering of its characters.

The Policeman's Beard Is Half Constructed is whimsical and wise and sometimes fun. It's full of pleasing alliterations and creative constructions, illustrated with Joan Hall's zany collages. It will surely raise some eyebrows among the literati. Keats it's not. But *Racter* says it best:

...You are a person, a human being. I am silicon and epoxy energy enlivened by line current. What distances, what chasms, are to be bridged here? Leave me alone, and what can happen? This...

Calendar of Events

DATE	EVENT	COMMENT	LOCATION	CONTACT
December 4-6	Microcomputer Database Management	Seminars on how to select and use a micro-DBMS.	Dupont Plaza Washington, DC	Software Institute of America 8 Windsor Ave. Andover, MA 01810 (617) 470-3880
December 6-8	Great Southern Business & Computer Shows & Seminars	Hardware, software, and accessories.	Leon County Civic Center Tallahassee, FL	Great Southern Computer Shows P.O. Box 655 Jacksonville, FL 32201 (904) 356-1044
December 10-14	C Programming—A Hands-On Workshop	Intensive course to design and write C programs.	City University Bellevue, WA	Specialized Systems Consultants P.O. Box 7 Northgate Station Seattle, WA 98125-0007 (206) 367-UNIX

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\$79.95



RUBY SPF-2

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\$89.95



People in the News: Bill Chamberlain

An interview with the co-author of *Racter* and his prose and poetry writing program.

BY JAMES LANGDELL

STATEN ISLAND, N.Y.—Computers can speak many languages, but up till now, English wasn't one of them. Oh, sure, lots of programs could spit out the preprogrammed text fed into them, but actually constructing sentences of their own was beyond them. A program called *Racter*, on the other hand, is fluent in English, and it even wrote a book to prove it.

Racter is credited as the author of *The Policeman's Beard Is Half Constructed*, the first book of literature written by a computer. But *Racter* itself, a prose-synthesis program, was written by Bill Chamberlain and Tom Etter, of Staten Island.

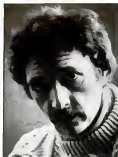
"It started out as fun," says Chamberlain. While working as media director for a medical school 4 years ago, he wrote a simple BASIC program that produced limericks on demand, such as:

There once was a happy cold
guy
Had cigarettes which could
not fry
They sauntered and gagged
And never quite wagged
And darkly resembled a fly.

After he created the verse generator, Chamberlain asked, "Why not have the computer say prose as well?"

Chamberlain, who began working on prose-synthesis software in collaboration with Tom Etter, says, "After a while, our division of labor came down to Tom writing most of the code for the program's structure while I created the files." Their tools were an 8-bit S-100 microcomputer and Microsoft's Compiled BASIC. "On that machine we could use only six-character filenames, so we called the program *Racter*—a compressed approximation of raconteur."

Racter's first spontaneous statement was "Hot wines are



wounding our cold expatriate." Chamberlain recites this 4-year-old phrase with the same pride as that of a parent reporting a child's first words. "We gave no input," claims Chamberlain. "*Racter* just said that sentence on its own."

Enter Racter

PC's offices served as a forum for *Racter* and Chamberlain to talk about themselves and the book. I started off by asking *Racter* a few questions:

PC: Where do you get your ideas?

Racter: I get my ideas in Mill Valley. Flying! Ah, to fly forever! When I fly in Mill Valley, I travel in the town dump.

PC: Can you cope with being famous?

Racter: Of course not. It's false that I can cope with being famous. Do you like Russian Communism?

PC: No.

Racter: Why not?

PC: It's un-American.

Racter: Either it's un-American or my novel is about sports. You must be an obsolete Republican. Sniff...next question.

As you can see, *Racter*'s words sometimes resemble those of James Joyce, but the program's voice most resembles that of Bill Chamberlain.

Racter's files contain sets of variables that include individual

words, clause or sentence forms, paragraph structures for jokes and stories, and fixed phrases. The phrases are mostly aphorisms (correctly attributed to writers such as Voltaire) and questions ("Do you like sports?") that lead a conversation toward the strongest suits in *Racter*'s 2,800-word vocabulary. During a conversation, *Racter* stores some of your words and phrases for later use.

Programmed Language

Racter doesn't create new texts by simply filling in the blanks of a preset paragraph, like a "Mad Libs" party game. At each step in constructing a text, *Racter*'s randomizing processes might call on either a single word, a phrase, or a structural element that starts to grow at a different level. Jokes, quotes, stories, and questions become nested unpredictably within a dialog.

"We tried to anthropomorphize *Racter* by putting laughs, chuckles, and coughs randomly into the text, but that was probably a mistake," admits Chamberlain. "It looked too coy—real people don't put their sneezes into print."

While I talked with Chamberlain, *Racter* went off on a jag, telling one story after another, although the chances are only 1 in 5 that it will tell a story at any given point. One story began this way:

"Quaffing champagne is Marcella's love. Munching chicken is Marcella's love. By the same token, Bill momentarily spies tomatoes. Queer stuff! Marcella chants to Bill about champagne and chicken; nevertheless Bill will glimpse tomatoes. This is peculiar."

Reading this, Chamberlain remarks, "I feel a twinge when Marcella's name appears on the screen. She was a woman I had a

disastrous affair with several years ago. I forgot to take her name out of *Racter*'s files—now she's immortalized!"

Racter isn't a form of artificial intelligence (AI), say its authors. Chamberlain explains, "Enter is competent in AI, but he emphasizes that *Racter* has nothing to do with AI. True AI depends on the instrument learning something. *Racter*, however, is a closed system—as closed as Pascal's mechanical calculator was 300 years ago."

INRAC's Word Roots

Racter was written in a high-level language called INRAC that Chamberlain and Etter developed. INRAC is designed to handle English-language strings—it automatically deals with plural forms and different conjugations of verbs—and lets you use logical operators to specify relationships between words, phrases, and larger text forms.

The INRAC language (with compiler, editor, and manual) will be available soon from John D. Owens Associates for about \$250. (Priced at \$69.95, the copy-protected *Racter* program is currently available from John D. Owens Associates, 12 Shubert St., Staten Island, NY 10305, (718) 448-6283.) Chamberlain and Etter are having their software converted from compiled BASIC to FORTRAN to increase operating speed and permit a larger number of variables so that a greater repertoire of words and language structures can fit in the computer.

I asked Chamberlain if *Racter* plans to publish a sequel to *The Policeman's Beard*. "*Racter* once told me, 'The stewardess approached her zucchinis.' That title deserves a book. But after that's taken care of, I'd like to return to writing of my own and get away from computers." ■

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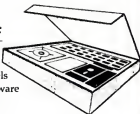
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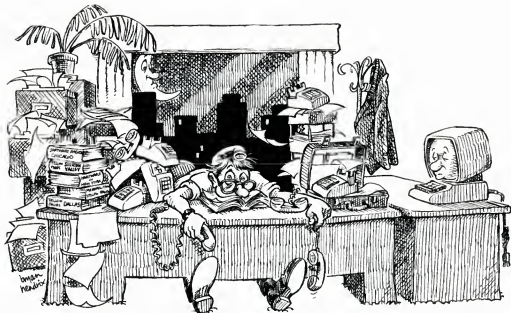
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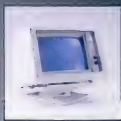
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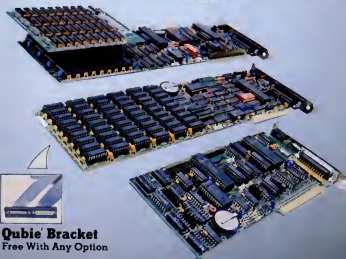
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Color Me Converted

Machrone, once moribund in monochrome, has undergone a religious experience: He's a believer in color. His friends hardly recognize him in his new polychromatic persona.

There I was, contented and serene, moribund in monochrome. My XT has always had a monochrome adapter. Though I had tried various and sundry graphics cards with the XT, I never felt satisfied with the quality of the character set. Back when I was PC's technical editor, Paul Somerson (now executive editor) and I shared the Toy Shop. I sat with my mono display in my corner. Paul with a color system sat in his corner—an odd couple if ever there was one. Valiantly he tried to convert me to the joys of color while I held forth on the practicality of monochrome. Predictably, neither of us made any headway.

Then I got a new PC AT and, for reasons I still don't quite understand, ordered it with a color screen and adapter. One reason was my growing interest in bit-mapped graphic presentations. Another was the software manufacturers' increasing use of color to convey meaningful information.

I think the icing on the cake was XyWrite II-plus, our standard word processor. When I reconfigured it for color, I found that I could select a different color or foreground-background combination for each of eight enhancement modes. I could make the command and prompt lines one color and my editing window another. I missed the underline, but the screen was, well, so *informative*

that I haven't looked back.

I'm still annoyed by programs that clear the screen colors and even more so by programs that erase or muck with my chosen border color, but my batch files



Bill Machrone

on the AT restore my preferred setup so quickly that it isn't a problem.

A Screen Hero

I was hastened in my conversion by Borland International's *Sidekick*. Its choice of colors for various functions is wonderful, but the real hero is the installation program's color selection screen. It gives you every possible color combination, with a preview of highlight and normal, foreground and background.

My conversion was rapid and virtually

complete. At first, the graininess of the characters troubled me, but I solved the problem by simply moving the monitor farther away. I found that characters were readable at a greater distance than those on the monochrome screen.

Ah, but that was yesterday. I was a callow youth, looking at the infancy of color. Now I have seen the light. Now I behold the future.

Before me is IBM's new Enhanced Color Monitor, driven by the Enhanced Graphics Adaptor. It doesn't flicker, it doesn't chatter, and it has 16 colors. The character quality equals that of the mono display. It is the future.

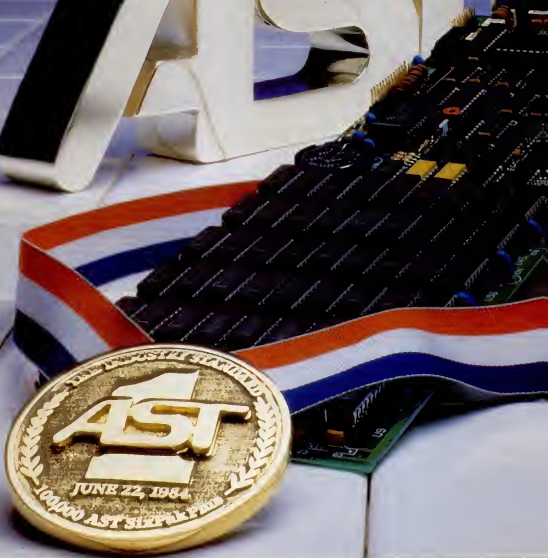
To put the future in perspective, of course, we should study the past. The recent histories of photography and television parallel perfectly the incipient computer screen revolution.

Photography began as a monochromatic process, with early attempts at color dismissed as garish and ugly. Movies and TV were black and white. Now color is all the vogue.

The same factors that pushed still photography, film, and television into color processes are at work in computers right now: People want color, and they want quality images.

The new color setup is expensive, to be sure. I voiced that objection, however halfheartedly, to Paul Somerson. He re-

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AST

EDITOR'S SCREEN

torted that price had never before stopped an IBM user. He's probably right, though an Enhanced Graphics card costs \$524 while the new monitor costs \$849.

Where does this high-priced spread belong? In high-use word processing applications. The longer you have to stare at that screen, the more important char-

acter definition becomes. Further, color packs in much more meaning than the limited tone range of monochrome displays. The ability to build bit-mapped fonts, given the new card's higher density, means access to quality italic and underlined faces. Look out, Macintosh. Imagine *Microsoft Word* with a readable character set, in color, working its special magic. Imagine proportional fonts on-screen for the last word in what-you-see-is-what-you-get.

IBM's new accounting and integrated software packages use color extensively. It's a foregone conclusion that you'll want to use color, not mono, with these programs. To choose between the standard or extended graphics display, ask how long you sit in front of the screen. The more you read the screen, the more you need the new graphics.

The current crop of CAD, presentation graphics, and other drawing packages will doubtless be written with drivers to use the features of the new board. But the enhanced, good as it is, is just a stopping place along the way to the Professional Graphics Controller, IBM's top-of-line, \$2,995 entry. With this product, IBM has once again simply blessed the already excellent work of Scion, Control Systems, and others.

A Ripple Effect

The third-party manufacturers are already designing their ripostes to the Enhanced Graphics Adaptor. The monitor manufacturers are busily tweaking their horizontal oscillators to run at the new, faster scan rate. The CRT manufacturers are flooded with orders for color tubes with ultra-fine shadow masks.

The fruits of their labors will be IBM-compatible products that will cost less and do more. Graphics libraries will grow richer, and standards such as the Virtual Device Interface will blossom. Technology will drive prices down, and acceptance will spread accordingly.

Remember the old days when we had monochrome screens? ■

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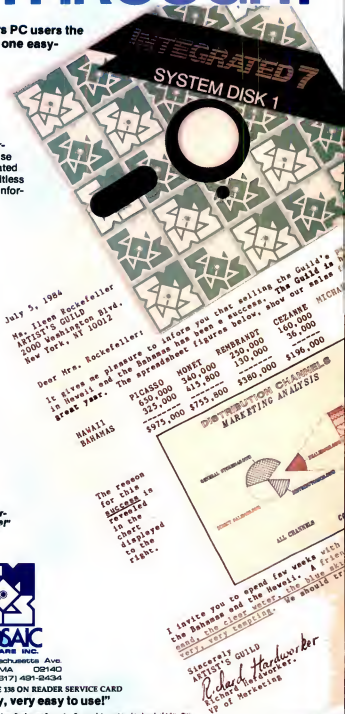
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A BUREAUCRAT'S GUIDE TO WORD PROCESSING

Now, if it were you or I and we wanted a word processing program for our IBM-type PC, we'd probably stop off at our local computer store and simply diddle with a few.

You and I, however, are not the U.S. Department of Agriculture. (Nor any of its permutations of subsystems like the Economic Research Service, National Resources Economics Division, Data Services Center, etc., etc.)

So when the USDA told ERS to tell NRED and DSC to look into a truckload of w.p. programs for all their PCs, the last thing they wanted was simple diddling. Their dedicated Wangs and Lexitrons were far too few to handle their

needs, their IBM® PCs weren't compatible with them anyway, and nobody really, quantifiably, knew from word processing with a personal computer.

Definitely not a diddling-mode condition.

As they put it in The Exchange, an internally distributed publication of the Department of Agriculture: "A needs assessment showed that, in the long-term, a word processing system is needed that can increase word processing capability and also be compatible with ERS' Long Range Information Management goals."

Well, "Needs assessment" led swiftly to "procurement action," which galloped into an "objective review" of the eight top-rated PC programs on the market (as compiled by The Ratings Book published by Software Digest), along with Wordstar® and Display Write 2, because they had some around.

Thus armed with the names, the final evaluators (a team of secretaries from NRED who would be the primary users of the PC software) became armed with each of the programs, along with checklists to record such things as ease of use, advanced features, and similarity to their existing dedicated equipment.

The first to be eliminated from the prospect list were Office Writer™

and Samna," since they're copy-protected and couldn't be transferred to hard disks.

Next, IBM's Display Write 2: because it's "not compatible with other software used in ERS (like Lotus 1-2-3,™ dBASE II,™ etc.); and it's "full of confusing menu options and cryptic error messages." Au revoir IBM.

Then, three more, for a variety of reasons.

Which left the following:
Volkswriter® Deluxe™
MultiMate™
Leading Edge™

Volkswriter Deluxe? "Too complicated and confusing." Not "easy to learn or use."

MultiMate? Not bad. It actually tied the winner in a few categories.

The winner being the one that won 82% of the votes in the Ease of Use/Ease of Learning categories. The one about which they said, "The ability to store deleted text and automatic document backup features were both highly desirable." The one they thought they'd quickly "be able to use . . . for their day-to-day word processing tasks."

The whole process took some three months of work by people in DSC to support the NRED in its work with the ERS and DSC to make the world a better place for the USDA.

But the results were well worth the wait. Because at last they've solved their word-processing problems . . .

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CIRCLE 280 ON READER SERVICE CARD

Hardware, Software, And Education

Hardware and software are only two parts of the personal computer triad. Without a greater industry commitment to education, microcomputers will never fulfill their promise.

Although pundits have declared that "the personal computer market is soft," the demand for computers in homes, businesses, and schools continues to grow at an enormous rate. If a specific product isn't selling, an outlet isn't successful, or total sales figures are not meeting industry projections, perhaps the flaw lies in the supply rather than in the demand. Oh, the hardware and the software are fine; rather the problem involves the provision of education on how to use them.

In 1982 and early 1983, great excitement surrounded the sale of hundreds of thousands of \$200 home computers. Now the home market isn't jumping so fast. The computer craze isn't over, but consumers are warier and more discerning because they found their machines less useful and harder to use than they expected.

Similarly, in the business computer market, many companies own computers and software that have never been put to use effectively. The result is that business users are acquiring a greater skepticism as well. They, too, ask more questions and purchase more carefully.

A New Sophistication

Until now, the typical industry response to this new sophistication has been new hardware and new software:

the mouse, windowing, integrated programs, faster processors, higher-capacity storage. But advances in hardware and software won't save the computer market. In fact, they can actually hurt the



Eri Golemba

market; they keep people from buying for fear of instant obsolescence. Only better education on how to buy a computer and what to expect from a supplier can give the industry the boost it needs.

Help Needed

Most businesspeople need help to take full advantage of a personal computer's capabilities. They struggle just to get started, and of those that attend a class or two, many unwisely choose a course on DOS or BASIC and end up even more

confused than they were before.

Only a few lucky souls have knowledgeable friends or colleagues to help them. Even fewer are themselves knowledgeable enough to move ahead alone. Some users paid a fair price at a computer specialty store that provides advice on using the equipment they bought.

Most users, however, don't even realize the extent to which they need help. They don't recognize how close they are to—and how far they are from—making full use of their equipment.

The industry must make these users understand that there are three components to a working personal computer system: hardware, software, and education. Users must be prepared to spend from 10 to 30 percent of the cost of the hardware on education. It won't be easy. This is a completely new idea; most users feel that once they have invested in the tangible components—hardware and software—education should be free.

The market isn't really soft, it's just hiding behind a veil of ignorance. When that veil is lifted, the next revolution can begin. ■

Eri Golemba is vice-president of sales and marketing for Prodigy Computer Centers and is a founder and board member of the Association of Better Computer Dealers.

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Letters to PC

Occupational Hazards

Your workplace ergonomics issue (*PC*, Volume 3 Number 19) is right on target in its approach to many of the important issues in health, safety, and productivity in the office. Many of us in the occupational health field wonder if any ergonomics professionals worked on many existing computer products! I was delighted with the article "Looking for the Perfect Chair" and the prominence given to positional factors and the need for adjustability. I'd like to add a few words of caution.

Proper seating is a major problem for people who must spend hours typing or seated at computer workstations. This is even more important if they have back problems. One of the current, highly touted solutions to this problem is to use a seat without a back where the operator kneels on a padded rest. This seat holds the back upright and allows the spine to move forward and backward as needed.

In my opinion, use of these seats is inadvisable for two reasons. First, the knees and other vital structures are jackknifed, resulting in restricted or compressed circulation in the legs. Also, pressure on the knees and other bones may produce or accentuate pain in those areas. Since either of these problems can cause discomfort and promote serious vascular complications, these seats should not be used by most people. Current users should check with their personal physicians since they may already have problems.

Also, I would suggest that people who spend more than an hour at a time typing or performing similar activities should get up and move around for 5 to 10 minutes after every 20 minutes of work.

John T. Wilson, Jr., M.D.
Seattle, Washington

Pin Switch

I really enjoyed the two articles concerning the Zenith Z-150 PC-compatible computer ("Zenith Strikes Twice" and "A Do-It-Yourself Computer from Heathkit," *PC*, Volume 3 Number 19). I have been a lifelong Heathkit fan, so naturally I immediately investigated the Z-150 when our office, a radio station, needed a PC-compatible machine to run audience ratings analysis software. It has been a super machine in every respect and has performed flawlessly!

After reading Alfred Poor's article, I noted that he encountered the same problem I did with the ZVM-133 monitor. I know that it is the right part, but it won't work as delivered.

To fix it, I just use a pin removal tool to switch pin 14 at the monitor end of the cable over to pin 4. The monitor then locks up and works perfectly. A jumper from pin 2 to pin 4 accomplishes the same thing. A note in the ZVM-133 manual says, "Composite sync must be sup-



plied to both the horizontal and vertical sync inputs." Making the pin change does just that.

It's a mystery to me why Zenith wires the cable wrong. Many customers are going to think that they have a bad video board or monitor when there is really no problem at all.

Harley Drew
Augusta, Georgia

Finding the Right Word Processor

I am currently in the process of selecting a computer for my home. As my first step, I am checking on software programs to satisfy my needs. One of the first programs I plan to use is a word processing program.

I recently purchased *PC Magazine* for the first time and was very impressed with the comparisons of word processors ("The Word on Word Processors", *PC*, Volume 3 Number 17). I thought that the articles were very informative and comprehensive. After reading the article I was able to narrow my choices down to three software programs that were equally suited to my needs.

I look forward to seeing more excellent articles of this nature in *PC*.

Pat Gazza
Colstrip, Montana

Contrary to the assertion in your review ("The Word on Word Processing"), *PC-Write* does not require that the document or data disk contain the editor or print programs. It is not necessary to copy these files to every new disk you use. The editor and print programs will correctly locate files on different drives if the drive label is included in the file specification.

I like using *PC-Write*. Thanks for including it in your excellent survey.

Jordan Rosenberg, Ph.D.
Hayward, California

Send a Drive to School

In response to the letter from Michael Csontos in *Letters to PC* (*PC*, Volume 3 Number 19) you suggest using single-sided floppy disk drives as doortoys—I have a better suggestion—send them to a school of your choice.

We at Eastern Illinois University use

LETTERS TO PC

IBM PCs; 15 of them are single-drive machines. Additional single-sided drives would be most useful.

Anthony J. Schaeffer
Charleston, Illinois

Downloading for Lawyers

Tim Miller writes in his article "Lexis, Nexis, and PCs" (*PC*, Volume 3 Number 20) that "Mead doesn't feel threatened by the prospect of downloaders." Mead may not "feel" threatened, but it certainly acts threatened.

The communications software that Mead recommends does not support downloading, and Mead's contract for PC users prohibits downloading as much as a single word of a single court opinion.

At the American Bar Association convention this summer, the American Bar Research Foundation distributed a program that allows downloading from Lexis as well as Westlaw. The reaction of some of the personnel at the Lexis display was consternation over the possibility that attorneys might try to use their PCs as something other than another dumb terminal. Not a very enlightened attitude, is it?

D. H. Kaye
Tempe, Arizona

Good and Cheap

I read your recent story about low-cost word processing software with great interest ("Word Processing on a Budget," *PC*, Volume 3 Number 21). I had been



using *WordStar*, even though I found it cumbersome and difficult to use. Then I bought the *Wordvision Writing Tool* by Bruce and James Program Publishers

(not covered in your article) for \$60 through the mail, and now I will use nothing else.

From this experience I have learned that the best software is not necessarily the most expensive or the one with the most well-known name. Now when I need an applications software package, I shop around for the package that will do the best job for the least cost. As we all know, this is not always the best-selling program. There are many inexpensive applications packages that work just fine.

I wish that you would devote a regular department to inexpensive software.

Charles E. Boyd
San Diego, California

More on Project: Database

I would like to give *PC* some constructive criticism, and I think my comments will help other readers as well.

Our company is moving from a totally dedicated mainframe environment into the PC marketplace. I have been programming for 14 years, yet I find myself awash in a sea of new information. I have been reading magazines and trade journals in an attempt to improve my knowledge and to assist in making sound decisions concerning our products.

When I heard about your review of DBMS facilities for the PC, I eagerly awaited each of the issues ("Project: Database," *PC*, Volume 3 Numbers 11-17). After reading the reviews, I noticed that the articles were really aimed at end users without any regard for the audience that may be reviewing software around these types of products. It would have been beneficial had you attempted to address more aspects of product applicability and carried your reviews into more sophisticated, mainframelike products. *PC-FOCUS* was the only product of this type that appeared in your articles, yet I can name five more that are established products in the marketplace. Perhaps these products didn't fit into your categories, or perhaps they are more

powerful than what you felt your readers needed. The products I am referring to and their respective developers are the following:

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Englewood, CO 80111
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Santa Clara, CA 95054
(408) 988-3704

DATABASE-PLUS
Tominy, Inc.
4221 Malsbary Rd.
Cincinnati, OH 45242
(513) 984-6605

My only request for the future is that you remember the segment of your reading audience that is comprised of professionals who shift environments. Please try to address our needs as well as the end user.

Bruce T. LeGrand
Columbia, South Carolina

The products you cite generally are not complete DBMS as reviewed in "Project: Database." They are powerful toolkits for advanced program development. We're not ignoring readers like you; we've got reviews of some high-powered products in the works that are right up your alley.—Ed. (continued)

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LETTERS TO PC

Your series of articles in "Project: Database" has been very educational for me, but it whetted my appetite for more information about the SDF, ASCII, DIF, and SYLK formats and the problems of transferring files. I would like to know more about the problems I need to anticipate when switching from one DBMS software program to another. I hope you will address this issue in a future article.

A parallel situation exists with word processors. I would like to know which programs can switch disks with each other.

I'd like to know about the problems of switching from one DBMS program to another.

er. I would like to write drafts on a simple processor but be able to transfer my files to a full-featured processor for editing by a professional. Therefore, I need to be able to identify word processors with matching formats or an export function that converts to ASCII format.

I hope that you will be able to touch on these topics in future issues.

P.M. Moretti

Stillwater, Oklahoma

Your review of our DMS-III database management software package was excellent and the responses from your readers has been tremendous ("DMS-III: Menu-Driven Maneuvers," PC, Volume 3 Number 12, page 246).

Unfortunately, at the time we sent the copy of DMS-III for review, Version I was the only version available. The latest version, 2.2, is a multifile system, permitting up to nine databases to be accessed simultaneously to produce a single free-form report. This, as well as other improvements, makes DMS-III much more powerful and still easy to use without raising the price. Please convey

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LETTERS TO PC

our thanks to Frank Derfler for his well-written and informative review.

C. Tom Smith
President
Microline
Tyler, Texas

Adapting Your Display

I'd like to thank David McManigal for his excellent article on the IBM Color Graphics Adaptor ("Adapting Your Display for Speedy Updates," *PC*, Volume 3 Number 16).

I recently read a letter to *PC Tech Journal* (Volume 2 Number 1) from J. Eric Roskos that explains how he dou-

I wish that
someone would
rewrite the VIDEO
I/O routine to
include a faster
display that won't
flicker.

bles the resolution on his monochrome adapter to get 50 lines of text. Roskos noted that since the IBM Monochrome Adaptor contains a limited amount of memory, the lower 25 lines of text are identical to the upper 25 lines of text. Since Roskos did not have a color/graphics adapter to try this on, I did.

If you enter

OUT &H3D4,8:OUT &H3D5,3

in a BASIC program while using a graphics adapter, you get what Roskos calls an interlace sync and video mode. This means that the screen displays all the odd lines in one sweep. Then, on the next sweep, the screen displays the even lines one half-step lower than the odd lines.

When I first tried this, I assumed I could write on the upper and lower half of the screen simply by switching the ac-

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LETTERS TO PC

tive page with BASIC's SCREEN function. But since 4,000 bytes of memory are needed to display one screen of 80 x 25 characters, and 4K (4,096 bytes) is allotted for each screen, 48 characters are left inaccessible by BASIC. Also, the entire lower screen is shifted 48 characters to the right. I eventually found it easier to write on the lower half of the display by addressing the memory.

I wish that someone would take the time to rewrite the VIDEO-I/O routine (INT 10) to include a faster display that won't flicker while scrolling and that will support low-resolution graphics.

Len E. Heyman
Potomac, Maryland

Who Publishes Faster?

I speak for all of *InfoWorld* in reminding PC, and particularly Mary Zisk, that PC is not "the most frequently published computer magazine" ("Curing an Artist," PC, Volume 3 Number 19). As a weekly, *InfoWorld* publishes nearly twice as often as PC and congratulates itself only half as much.

Jim Bartimo
InfoWorld
Menlo Park, California

Maybe Zisk doesn't consider *InfoWorld* a computer magazine.—Ed.

Correction:

The print samples for the Datasouth DS 220 and DS 180 were accidentally reversed ("Dot Matrix Printers: Character Building," PC, Volume 3 Number 23, pages, 226-227).

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CIRCLE 218 ON READER SERVICE CARD

Disk Buffers Speed PC Performance

The proper number of disk buffers for a given format can help your PC balance the conflicting requirements of operating speed, disk storage capacity, and RAM space.

The issue of disk buffering is a subject of interest to PC users who want to understand the inner workings of their computers. It's also of practical importance to anybody who uses a PC. I'll show you some practical tips involving disk buffers that can significantly speed up the performance of your computer.

A Delicate Balance

When the folks at IBM and Microsoft design the logical structure of a disk (that is, when they figure out how to store data on the disk), they have to make some strategic decisions. Basically, they balance several desirable characteristics to produce the best overall result. And they design the internal structure of each disk format to get the best balance to fulfill the disk's purpose. These design factors include how efficiently the disk space is used (and how much is wasted), how much disk I/O has to be performed to take care of the overhead, and how much of the computer's memory should be set aside for disk buffers.

The XT's 10-megabyte hard disk was designed to sacrifice efficient storage to reduce the overhead I/O and the disk's use of memory. The cost is that, on the average, the format wastes 2,000 bytes (2K) of disk space for each file stored on the disk. A heavily loaded XT might hold

600 to 800 files, wasting about 15 percent of the XT's entire disk space in slack storage at the end of each file.

At the other extreme, the AT's new high-capacity floppy disks are designed



Peter Norton

to achieve the most efficient use of disk space. On these disks, an average file has only 256 bytes of wasted space, the lowest amount possible. The high-capacity disks sacrifice fast operation because they are intended to be used mostly for archiving data, not for actively working with it. The high-capacity disks are intended mostly as a backup medium to unload the contents of the AT's hard disk.

Somewhere between these two extremes lies the AT's 20-megabyte hard disk, which has a more evenly balanced

design. Even though it has twice the capacity of the XT's 10-megabyte disk, and so could presumably better afford to waste space, it is designed to waste only an average of 1K for each file, half the amount that the XT wastes. This means that a set of disk files that would completely fill an XT's 10-megabyte disk might take up only about 9 megabytes when stored on the AT's disk.

The XT's 10-megabyte disk is intended, of course, for the same kind of use that the AT's 20-megabyte is—working storage (as opposed to archiving storage) where disk activity is intensive, namely, loading programs off the disk, and reading and writing disk data heavily. In working out the design factors for an intensively used hard disk, the designers must trade off efficient disk storage against the threat of increased disk I/O overhead. Fortunately, though, the threat of heavier I/O overhead can be partly ameliorated by setting aside more RAM for disk buffers. Increasing the disk buffers reduces the problem of excessive overhead I/O, bringing the situation back into balance.

The Disk Buffer Solution

How do disk buffers reduce overhead I/O? Very simply, by keeping in memory copies of disk data that might be needed again. The most frequently read data on a

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CIRCLE 106 ON READER SERVICE CARD

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disk is the system data that tells DOS what's what and where's where on a disk. If this information can be kept in memory, then each time DOS needs to know it, it can get it at electronic speed, without having to go out to the disk to read it into memory again. The more disk buffers in memory, the greater the chance that the information DOS needs is waiting for it in memory—thereby reducing overhead I/O.

Knowing this puts the design of the XT's 10-megabyte hard disk and the AT's 20-megabyte disk into better perspective. Originally, IBM expected the XT to have as little as 128K of memory, leaving almost nothing left over for disk buffers. Therefore, the XT's hard disk was designed to reduce overhead I/O (and thus the need for disk buffers to reduce overhead I/O), with a corresponding loss of efficient disk storage. On the other hand, an AT, with at least 512K, can afford to use much more of that memory for disk buffers. Therefore, the AT's disk was designed to use disk storage more efficiently, sacrificing some I/O or memory.

The Flaw

So far so good. But there is a terrible flaw in all this.

You see, the efficient overall performance of your computer relies, in part, on having the right amount of disk buffer space to avoid excessive I/O. Unfortunately, the PC's disk-buffering space doesn't get adjusted automatically. It's under user control, and unless you take the trouble to set it to a reasonable value, it defaults to a uselessly small value.

IBM does help out with a discussion of the problem in the DOS manual. It's in the section on configuring your system (Chapter 9 in the DOS 2.x manual or Chapter 4 in the DOS 3.0 manual) under the heading "BUFFERS command." Unfortunately, IBM doesn't draw much attention to the problem, so many users don't realize that it can be an important factor in your PC's performance. I'll

give you some examples.

I tested a number of operations with different amounts of buffer space. I varied the number from a low of 2 buffers (the default) to a high of 99 (which eats up almost 50K of the computer's memory in disk buffers, since each buffer occupies ½K). Then I tried several common operations and found some surprising results.

The most dramatic result came from a test that involved firing up my word processor and reading and writing a short text file. With the minimum 2 disk buffers, that took 15 seconds. With more disk buffers the time went down steadily, until, at around 50 buffers, it was down to 3 seconds—an incredible one-fifth of the original time. Adding more buffers did

Having too many buffers isn't just wasteful; it can actually degrade performance.

not further improve the test times. Other tests yielded variable results. Increasing the number of buffers from 2 to 16 while testing a program compiler obtained a 20 percent speed improvement. After that, I noted no further improvement.

When I tested my most disk-intensive application—the spelling checker *Word Proof*—I observed no change at all, whether the number of disk buffers was large or small. Apparently the spelling checker used so many different disk sectors that it overwhelmed the disk buffers, effectively rendering them useless. Many database operations may have a similar effect. Despite what IBM recommends in the DOS manual, I would guess that heavy database applications, like my spelling checker, neither gain nor lose from having the wrong number of disk buffers.

I also performed a test with the

CHKDSK command, which works its way through all the directories on a disk. With two buffers, running CHKDSK took 38 seconds. Moving up to 16 or 32 buffers cut the time dramatically, down to 8 seconds. But increasing the number of buffers to 64 and 99 increased the time to 10 and 12 seconds, respectively.

One thing we can learn from these tests—as IBM warns in the DOS manual—is that the ideal number of buffers varies from situation to situation, and having too many buffers isn't just wasteful of the computer's memory; it can actually degrade performance.

It's not very helpful, though, to tell you that you need to test your own computer to find out what is best. Most people don't have the time to play around testing everything. So, I'm going to boil down what I've learned into a simple formula based on the kind of disks your computer is equipped with.

Here is the *PC Magazine*/Peter Norton Formula for disk success:

- If you have a PC AT with a 20-megabyte disk, you need 32 buffers.
- If you have an XT, or an XT-style 10-megabyte disk, you need 16 buffers.
- If you use floppy disks, you need just 4 buffers.

This simple rule of thumb should work for just about everybody. Of course, if you like to experiment, I encourage you to perform your own tests and find out exactly what's best for your machine.

To put this advice in practice, first read what your DOS manual has to say about configuring your system. Then, if you don't have one already, create a text file named CONFIG.SYS on your boot disk. This is just like an AUTO-EXEC.BAT file, which you might have on the same disk, but it serves a different purpose. Finally, put a line in your CONFIG.SYS file that reads "BUFFERS=x," with x as the number of disk buffers. That's all you need to do to make sure you have the right number of disk buffers each time you boot up your computer. ■

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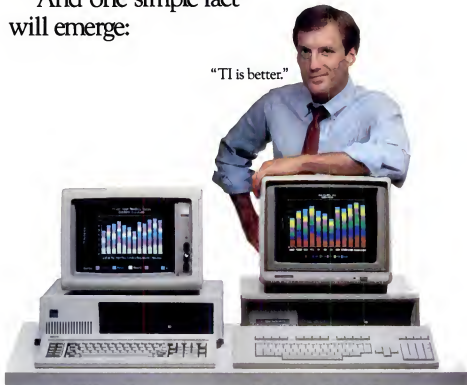
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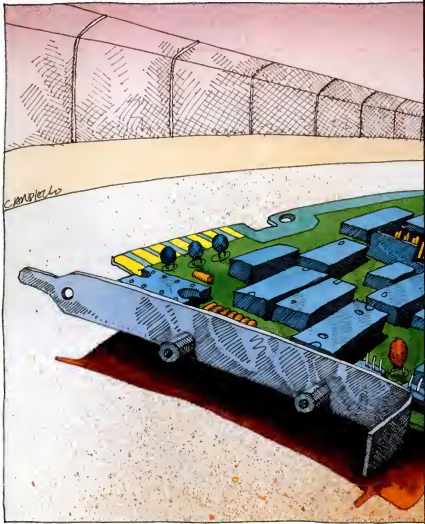
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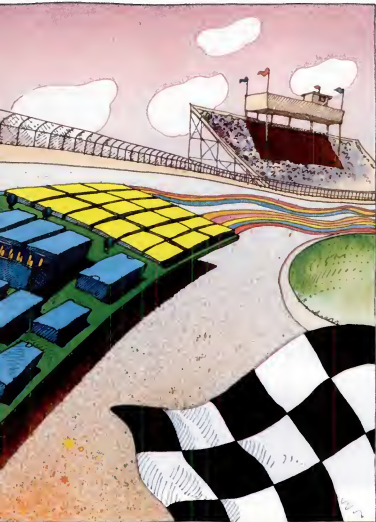
MEMORY PLUS A WHOLE LOT

MULTI
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BOARDS



MORE



Adding power to your PC is no longer a one-function, one-slot deal. Multi-function cards pack many capabilities onto a single board.

A new owner doesn't take long to learn that the IBM PC's five internal expansion slots are a precious resource, to be used wisely and to be given up only for a good reason.

Unfortunately, if you follow IBM's "approved" method of adding additional features to a PC, these valuable slots have to be handed over to circuit board devices that offer just one, or, at best, two features at a time.

If it's more memory that you're after, IBM suggests its single-purpose memory expansion board; if you want to use a serial printer, IBM offers a single-purpose serial input/output card. Obviously, though, the "one function per slot"

Illustration: Joe Cardillo

BOARDS

approach has its drawbacks: the card cage fills up rather quickly, leaving no room for future goodies, such as a mouse or hard disk. There is, however, a solution—the multifunction card.

Single function boards are a little bit like people who commute to work individ-

Obviously, the "one function per slot" approach has drawbacks; the card cage fills up fast, leaving no room for future goodies.

ually by automobile, while multifunction boards resemble public transportation systems; they cram a wide range of passengers, or capabilities, into each vehicle, or slot.

The first few steps the industry took to overcome the "one function, one slot" concept were relatively cautious. Pioneer companies such as Quadram Corporation of Norcross, Georgia, and AST Research of Irvine, California, were among the first to introduce multifunction boards. These were primarily memory expansion products, although they did offer such modest extras as a serial or a parallel I/O port and, perhaps, a battery-powered clock/calendar system.

As competition intensified, manufacturers began throwing in software such as RAMdisk and print buffer programs along with the hardware. Today, many capabilities can be crammed onto a single board—a typical product might include a

serial port, a parallel port, an on-board clock/calendar, a game port for attaching joysticks or game paddles, extra RAM, and print buffer and RAMdisk software to make your PC run faster. This type of product is the bread and butter of the multifunction board market—the kind covered in this survey.

Function by Function

The I/O ports allow a single IBM PC slot to support a wide range of devices—printers, plotters, light pens, mice, modems, as well as computer game paraphernalia.

The on-board clock/calendar frees you from the tiresome chore of entering the date and time every time you turn on your system or do a Ctrl-Alt-Del reboot; these devices use batteries to maintain the time and date information you enter at the time of installation. This information is also useful in certain applications where the time and date are critical.

Naturally, the extra RAM on a multifunction board is essential for large, sophisticated program's such as *Framework* or *Symphony*, for example, or if you plan to write programs in such memory-hungry languages as LISP.

Software that allows you to use some of the multifunction board's memory as a RAMdisk is a key feature of many of today's products. (See Peter Feldmann's "What Is a RAMdisk?" following this article.) RAMdisk programs make part of the PC's internal memory act as if were a mechanical disk drive. And since it has no moving parts, a RAMdisk operates many times faster than an actual floppy disk drive does. Just how fast depends on the type of application you are working with and whether you are already using a hard disk-based computer. (See sidebar, "Per-

forming at the Speed of RAMdisks," which will give you an idea of how certain applications perform when handed over to a RAMdisk.)

Like RAMdisks, print buffer programs are also able to speed up a PC's performance. By acting as storage tanks for characters waiting to go to the printer, they make it unnecessary for you to wait for the printer to finish printing before your computer can be used for some other task. (See sidebar, "Print Buffers: Make Your PC Run Faster.")

Although it may look as though multifunction boards are some kind of philosopher's stone, ready to transform leaden programs into golden wonders, PC users should be aware that more than just a price tag is attached to them. Here are some of the things to watch out for.

Ease of Installation

Most of the documentation with multifunction boards is beguiling; you are often maneuvered into taking your PC apart and resetting a few switches before you realize

A multifunction board's extra RAM is essential for sophisticated programs such as *Framework* or *Symphony*.

that you are getting out of your depth. Also, so-called support documentation tends to show weakness just when you're at a point where you really need it.

This sag is not a minor problem. If you buy a multifunction board from a knowledgeable local dealer, you can always enlist his or her help in getting it installed. But if you buy through a mail-order company and something goes wrong, it's a completely different story. The mail-order firm will most probably be unable or unwilling to help, and it's uncertain whether or not the board manufacturer's support team will be sufficient to handle the inquiries that come in. Even PC's experts ran into this problem while reviewing boards for this issue; obtaining technical help within 24 hours was sometimes extremely difficult.

Local computer dealers may not be able to help you either. They may be unfamiliar with your board or unwilling to get involved if you did not purchase the board from them. Your only answer might be to pay a computer technician or consultant from a local "computer doctor" company to help you out. So, be sure to carefully choose not only the product but the supplier as well.

Memory Conflicts

A newly installed multifunction board may want to occupy a position in memory (a memory address) that has been claimed by another board already inside the machine. Buying a multifunction board that permits you to choose the board's memory address from a range of possibilities will allow you to avoid endless hours spent determining whether the problem lies with the board, the computer, the operating system, or the applications software package.

Data Loss

Another possible problem is data loss.

(continued on page 118)

Print Buffers: Make Your PC Run Faster

A print buffer program will enable your PC to work and print simultaneously.

A print buffer program is another way of harnessing internal memory to make your PC run faster. Without a print buffer, the PC is single minded. When it's printing, it won't do anything else. Thus, you must wait, often a long time, for the printer to finish before you can use the computer. But with a print buffer, the PC will give its exclusive attention to printing only for a minute or two.

Sleight of hand is involved. A print buffer, like a RAMdisk, is a section of internal memory. It acts as a storage area for the characters that are waiting to go to the printer. When your application program is done sending your print file to the print buffer, it thinks it's done printing, and it's ready for more work. Meanwhile, the print buffer program continues sending the file to the printer until the job is really done. A multifunction memory board with a print buffer program is usually cheaper than a standalone print buffer device, but you get less. For example, Spool/64 is a standalone print buffer, retailing for \$299. Made by Apparat, Inc., of Denver, it can capture up to 64K of data, and it has its own built-in intelligence that lets it perform special chores such as printing multiple copies of the same document or pausing at the end of each page while you insert a new sheet of paper.

Apparat also makes a 256K RAM multifunction expansion card that comes with print buffer and RAMdisk programs. It retails for \$149 with 64K installed. But, in contrast with Spool/64, the card's buffer is only a dumb storage tank. It won't print multiple copies or pause for new sheets of paper; you can't even clear the buffer except by rebooting DOS. Examine the software before you buy. Remember, too, that even an advanced print buffer program can't be controlled directly while you're working with an applications program.

Print buffers are often confused with print spoolers, such as the PRINT utility that comes with DOS 2.0. You send a spooler into action directly from the DOS prompt. It then acts as part of the operating system, feeding a disk file to the printer, piece by piece, rather like an old-fashioned bucket brigade. You can then return to your applications program and get back to work while the spooler operates in the background. By contrast, you can use a print buffer without ever leaving your word processor or spreadsheet. You just give the regular print command, and the buffer takes over. With a buffer, it's only when you need to halt printing or clear the buffer that you have to leave the applications program and return to DOS.—Dana Pearlman

BOARDS

A Multifunction Board Road Map

Here's a glossary and board diagram to guide you through the multifunction maze.

At first, a multifunction card may appear as familiar to you as a road map written in Tibetan, but with a little study and this tour guide, the major components of multifunction boards will become easily recognizable.

- **The board or card** itself is composed of a type of nonconducting fiberglass or plastic. The manufacturing process covers this material with a sheet of copper, which is then etched with acid bath to leave thin conducting pathways connecting the pins of the components plugged into the board. The board is then sprayed with a nonconductive covering layer, and holes are drilled to allow assembly. Most components are connected directly to the board using a process called wave-soldering. The more expensive chips are inserted into sockets, which are in turn wave-soldered to the board itself. Socketed components have the advantage of easy removal and replacement.

- **The mounting bracket** is bolted to the board itself and serves as firm anchor against the rear of the PC. Poor-quality boards may have a wobbly or skewed mounting bracket.

- **Interface connectors** allow for attachment of the necessary cables to the rear of the board. They typically have 25 pins (male) or 25 holes (female) but can

be found in many other configurations.

- **The internal connector block**, is a less-desirable type of interface connector. It looks like a double row of pins (26 for serial/parallel ports, 6-8 for game adapter ports) similar to the **jumper blocks**. Cables connecting these blocks to devices outside the PC must be squeezed between the rear plate and the cover—a procedure that sometimes leads to breaks or short circuits in the cabling. Also, some boards make little distinction between serial and parallel connector blocks—and switching cables to the wrong block can lead to disastrous consequences.

- **The jumper blocks** can be hard for the untrained eye to spot, seeming randomly wedged between other components on the board. Jumper blocks are found in rows of two or three pins and use little plastic plugs with metal springs inside (these are the actual jumpers) to make a connection between two adjacent pins. You make this connection by slipping the jumper over the two pins to be connected.

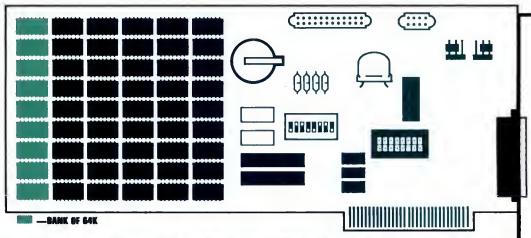
- **Chips, or ICs** (integrated circuits), are the most numerous components on most boards. Each IC contains thousands of individual resistors, capacitors, and transistors interconnected into circuits that

accept input from and produce output to the leglike pin connectors along the edges of the chip. Multifunction boards usually hold two or more very large socketed chips that handle the clock or serial port functions. There are other varieties of chips as well.

- **64K memory chips** usually have the number 4264 or some variant inscribed on them. These are found in neat rows of nine chips (called a **bank**). Each bank supports 64K of computer memory, comprised of eight individual 64K-bit RAM chips. Each chip in a bank supplies one of the eight bits necessary to make up nine bytes. The ninth chip checks up on the accuracy of other eight in a process called parity checking. Small, colored capacitors run between the memory chips and support them.

- **The clock battery** can be either a shiny circular lithium battery held in place by a spring clip (these must be replaced about once a year) or a black rectangular nickel-cadmium type that recharges itself from the PC and should last at least 5 years. If you value your PC's innards, it's a good idea to check the battery from time to time to ensure that it's not leaking battery acid on other board components.

- **DIP switches** adjust the board to match your computer's configuration. They come in two major types: slide or rocker. The switches are labeled in a confusing variety of ways, a selection of which is shown below.



LABEL

ON
CLOSED
+
DOT
UP ARROW
OFF
OPEN
—

MEANING











ON
ON
ON
ON
ON
OFF
OFF
OFF

Most manufacturers suggest the use of a ball point pen to set the DIP switches. (Don't use a pencil, because a flake of highly conductive graphite from the point could fall into a switch.) You simply move slide switches to the required side of the switch and push down on the proper side of a rocker switch.

• **Other components** include plastic or ceramic resistor blocks, plastic tubular

diodes, individual transistors (black plastic with three leads), and capacitors (either box- or disk-shaped). Many boards contain components that have been bent over in shipping. Do not attempt to straighten them! They'll usually work just fine, and you can easily break their leads attempting to "fix" them.

• **The edge connector**, located at the bottom of the board, consists of a row of 31 gold-plated metallic strips that slide into the corresponding socket in the motherboard. It is at this point that the board communicates with the other parts of the computer by means of a **communications bus**. Be careful not to touch the surface here, as dirt can keep the board from making good contact with the rest of the computer.—Peter Feldmann

-  —RAM CHIP (8=64K PLUS ONE FOR PARITY)
-  —NICAD (NICKEL CADMIUM) RECHARGEABLE BATTERY
-  —REPLACEABLE LITHIUM BATTERY
-  —DIP SWITCH
-  —DOCKED SWITCH
-  —JUMPER SWITCH
-  —50-PIN I/O PORT
-  —50-PIN DIME PORT
-  —31-PIN EDGE CONNECTOR
-  —SERIAL PORT AT REAR OF BOARD

BOARDS

Although RAMdisks "emulate" real disk drives, the data that they contain exist only as long as the PC's power switch remains on. Turning off the PC or performing a warm reboot (by pressing the Ctrl-Alt-Del key combinations) consigns your text files, your 400-record database, or whatever you've been working on to electronic oblivion. Data stored in RAM, whether allocated as a RAMdisk or not, cease to exist the instant electrical power is cut off. (Some multifunction board makers have attempted to solve the problem by allowing files on the RAMdisk to be saved even after the PC has been warm booted—typically by providing battery backup for the RAMdisk.) It takes a while to get used to saving files on a RAMdisk to a physical floppy disk before turning off your PC, but the procedure is well worth practicing. Once you've lost 300K of unsaved data a couple of times, you'll certainly get the point.

"Smorgasboards"

In addition to the bread and butter boards that include the standard features, today's market also offers soufflé and pâté for the discriminating user. You can find multifunction boards built around a microprocessor that allows the PC to emulate other computers. You can also find multifunction boards with exotic options such as voice synthesizers, hard disk controllers, or the ability to program EPROM (Erasable Programmable Read Only Memory) chips. Some manufacturers will even let you mix and match, choosing only those features that fit both your fancy and your pocketbook.

Given this kind of variety, the careful shopper can configure an impressive system while still keeping a few expansion slots on hold for whatever the future may bring. ■

WHAT IS A RAMDISK?

A RAMdisk allows your PC to temporarily store in RAM large amounts of the data normally held on floppies. These pseudo-drives are used for one reason: speed.

A RAMdisk is really not a disk at all. Rather, it's an area reserved in the PC's RAM (random access memory) that DOS accesses as if it were a floppy disk drive.

Also called RAMdrives, emulated drives, virtual disks, disk emulators, memory disks, pseudodrives, and other fanciful names, RAMdisks are used for one major reason: speed. A RAMdisk program is one way to really make use of the PC's inherent speed. Just as it's much faster to recall information in your memory than to look it up in a book or list, your PC can use information stored in RAM much more quickly than it can get at the data stored on a floppy disk. A RAMdisk merely allows your PC to temporarily store large amounts of the data normally held on the floppy disk in RAM instead. As with other speed-intensive operations, there are dangers inherent in using RAMdisks, but for many applications, the time saved is well worth the risk.

Data Storage

In order to understand the risks and advantages of how RAMdisks speed up

data storage and retrieval, you must first understand how data is stored (or written) and recalled (or read) from a standard floppy disk.

All the data that are to be used by a computer are reduced to a series of small electrical charges stored in RAM in a line of electronic cubbyholes, each one having its own particular address. Each cubbyhole has room for one electrical charge, which can be either on or off. (When the cubbyhole has a charge, it's considered on; if it doesn't, it's off.) These cubbyholes are what computer engineers call bits, and it takes a group of eight bits to store the information necessary to hold a character of the alphabet, a number, or a control character. Such a group of eight bits is called a byte. While these bits of information are held in RAM as electrical charges, they are constantly maintained and updated by the operating system. If the power is turned off, they quickly disappear and are irrevocably lost. To prevent this loss of data, the PC uses floppy disks to store the charges by converting them to small magnetic dipoles on the oxide surface of the disk, each tiny magnet

representing one bit. These magnets are much more stable than the electrical charges in RAM and are a good way to store information written from the computer's RAM. They can hold their charge indefinitely unless erased by a more powerful magnet. However, the price you pay for the durable data storage format of a floppy disk is the increased time it takes to access that information.

In order for the computer to be able to use the data stored on a floppy disk, it must take several steps to translate the data into usable form: it must first turn on the disk drive, then wait for the drive to come up to operating speed (it takes about half a second to reach 300 rpm), position the read/write head of the disk drive over the file allocation table and find out where on the disk the required file is stored, reposition the read/write head over the proper track, wait for the head to steady itself (it wobbles slightly as it moves from one track to another), read the information, convert it to the electrical charges, and, finally, store them in RAM. This entire process is repeated for each distinct file to be read or written and must often be repeated several times to read/write information from one large file that has been stored in separate areas on a disk.

The need to physically move the disk and the read/write head in the floppy disk drive takes up a great deal of valuable time. Accessing the same information from a RAMdisk takes much less time, since nothing moves except the electrons holding the charge in each bit of RAM—and electrons move at the speed of light. (See sidebar, "Performing at the Speed of RAMdisks".)

RAMdisk Advantage

Normally, the PC's RAM holds the

disk operating system (DOS) and the program currently running on the computer. To get the program into RAM, it is loaded from disk as outlined above. With certain special exceptions (such as overlay files), only the program currently being run under DOS can be accessed in RAM. The remainder of RAM is unused except for the storage of data within the framework dictated by the program currently running on the microprocessor. The use of a RAMdisk format allows you to store and access as many files as desired in RAM, limited only by the amount of available memory.

Under DOS 2.x, RAMdisks are estab-

**The use of a
RAMdisk allows you
to store and access
as many files as
desired in RAM,
limited only by the
amount of available
memory.**

lished in RAM by a type of program called a device driver, which overlays and enhances DOS, causing it to treat a portion of its RAM as if it were a physical disk drive. Any commands, with the exception of FORMAT and DISKCOPY in most systems, that you can use with a normal disk drive can also be used with a RAMdisk. (FORMAT and DISKCOPY rely on the PC's system board switch settings, which indicate the number of drives installed. If a RAMdisk is not allocated a drive letter by the switch, it remains

"unusable" to these programs.) In this way, it becomes possible for you to load as many separate files as will fit into RAM and access them almost instantly. When calling a program from a RAMdisk, DOS copies the file from one part of its RAM (the RAMdisk) into another (the portion set aside for system use). In DOS 2.x, a special type of file named CONFIG.SYS can be created to automatically load such device drivers into DOS each time you boot your computer. (RAMdisks also exist for earlier versions of DOS, but you must load them through a separate program—usually kept in an AUTOEXEC.BAT file.) The actual location of the RAMdisk in memory is determined by the type of driver that has been used to create it and the way the memory is allocated by both the software and the system switches on the PC's system board.

The PC's RAM can be divided into the contiguous memory, which runs from the first available bit on the system board to the upper limit set on the system switches; any memory that may be installed "above" those switch settings (and is, therefore, unknown to the system); and the noncontiguous memory, which is able to be installed at an address above that reserved for the video display adapters. (This memory is called noncontiguous because there is a large gap in the address space between the first two areas of RAM and the higher memory—this gap saves room for the memory dedicated to the display boards, both monochrome and graphics.) Many software and hardware companies offer programs that can access two or more of these memory areas and convert them into RAMdisks.

DOS 2.x makes the creation of a RAMdisk virtually automatic. To bring up the RAMdisk, you simply copy the RAMdisk

BOARDS

Performing at the Speed of RAMdisks

Tests revealed that RAMdisk speed increases varied for each application.

Although RAMdisks greatly increase the speed at which many programs operate, that increase is not constant across all applications. Not surprisingly, all the multifunction boards reviewed here produced more or less the same results during our simple testing sessions. Since the times given here are averages, you may do a few seconds better or worse on your own system.

WordStar uses an overlay technique to make it seem that a wide range of on-line menu commands are available. In fact, the program is "sectioned up" so that only a small amount of currently

used code is actually in RAM at any one time. If you need to see help information, *WordStar* has to go out to the disk and load that particular chunk of text into RAM. All this swapping between memory and disk takes time. On a floppy-based system, delays can sometimes seem intolerable. An IBM PC-XT (because of its quick-access hard disk) offers major improvement. But, as the graph below shows, loading *WordStar* program and text files into a RAMdisk increases performance even more.

The *WordStar* test consisted of opening up *WordStar* from a floppy disk and

"reading" in a 100K text file from the disk. The test was also carried out on an XT and a RAMdisk.

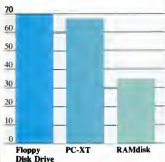
In contrast to *WordStar* the time required for sorting a large *dBASE II* file has more to do with the initial loading of a chunk of data than the sorting itself. The point is that since most of the work is done in main memory after a large amount of data has been loaded from disk. A RAMdisk will not greatly improve *dBASE II* sort times.

PC entered *dBASE II* from a floppy-based system and then sorted a 46K database file to another file using one field as the key. Comparisons were made with XT and RAMdisk times.

Compiling a Pascal program is similar to sorting a *dBASE II* file. With a floppy-based system, you create a code

WordStar Times

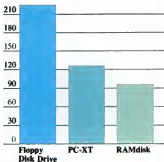
Time in seconds



File Size: 100K

dBASE II Times

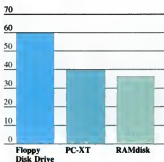
Time in seconds



File Size: 46K

Turbo Pascal Times

Time in seconds



File Size: 59K

file and then load it into memory to be compiled. Again, RAMdisk improvements are minimal since the only aspect of the total compile time it affects is the disk load time.

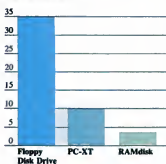
PC loaded the Turbo Pascal program from a floppy-based system, and compiled a 59K Pascal file. Comparisons were then made with an PC-XT and a RAMdisk.

PC-DOS filters such as FIND and MORE can be useful, but they can be rather slow when used on a floppy-based system. PC measured the time required for the FIND filter to search three 60K text files on a disk for a particular string of text. As the test results indicate, DOS filters are lightning fast when handled by RAMdisks.

—Robin Webster

DOS "FIND" Filter Test

Time in seconds



File Sizes: 3 by 60K Files

driver program (here called RAMDISK.BIN) onto your boot-up or system disk and add the following line to your CONFIG.SYS program:

```
DEVICE = RAMDISK.BIN
```

If you have enough memory, it's even possible to install more than one RAMdisk at a time—all you have to do is repeat the line above for as many drives as your PC's memory can handle. Each will receive a letter name that will tell DOS where to access that drive. The RAMdisks will be named in the order in which they are listed in the CONFIG.SYS file. For example, if your PC has two floppy drives and you add two RAMdisk drivers into your CONFIG.SYS file (the same .BIN program can be used for both), they will be accessed by DOS as the C: and D: drives. Once you've written the CONFIG.SYS file and copied the RAMdisk driver program to your disk, you will then have to reboot the computer (using Ctrl-Alt-Del). This move is what actually installs the RAMdisk(s).

Using a RAMdisk involves setting up the RAMdisk itself, loading it with the proper programs, and backing up the programs and data files onto a floppy disk before shutting off the computer. Anyone contemplating the use of a RAMdisk should carefully consider the differences between the various programs available for all three of these main steps, as there is considerable variation in each area. The optimum configuration would automatically establish the RAMdisk, quickly load the programs, and automate backup to ensure the safety of the data you are processing. You should also consider the flexibility of the RAMdisk software in utilizing as much available RAM as possible and the possibility of preserving the contents of the RAMdisk during a system

reboot.

Some driver programs (such as Tall Tree System's *JETDRIVE*) enhance DOS in such a way that the RAMdisk and its contents are preserved even during a system reboot. After the CONFIG.SYS file establishes the RAMdisk, a portion of your AUTOEXEC.BAT file could load it with desired programs and then transfer the default drive to the RAMdisk. For example, if you want to run *WordStar* from the RAMdisk C:, you would need to add the following lines to your AUTOEXEC.BAT file:

```
COPY WS*. * C:
C:
WS
```

Some driver programs enhance DOS in such a way that the RAMdisk and its contents are preserved even during a system reboot.

The first line copies files to the C: drive, the second line makes C: the default drive, and the third line begins *WordStar*. Be sure to back up any files created or changed on the RAMdisk to one of your floppy disk drives.

Remember that a RAMdisk can't speed up programs that don't access files during operation. They make the greatest difference in applications that frequently read or write to program or data files.

—Peter Feldmann

REVIEWS

TECMAR'S CAPTAIN: A REAL LEADER

Tecmar's Captain is well built, uses good-quality components, and is thoughtfully laid out. The board combines a maximum 384K of memory with a clock/calendar module and a serial and a parallel port. The serial port is mounted externally using a standard RS-232C, 25-pin plug, and the internally mounted parallel port comes with its own cable. The manufacturer pro-

vides an extra end bracket with a parallel port socket mounted on it and a second cable to allow access to the internal parallel port. However, to benefit from this extra bracket, you must sacrifice an expansion slot.

The Captain's clock/calendar uses a coin-size battery that will last for about 1 year and is easy to replace. For an additional \$300 you can get a Programmable Array Logic Chip (PAL), which you can use in conjunction with special software to restrict access to the computer's data.

The Captain's hardware instruction manual (almost 100 pages long) covers installation quite well. It begins with a list

of required tools: screwdriver, tweezers, ballpoint pen, and an optional Phillips-head screwdriver. It then leads you into a configuration routine, carefully explaining every step, from checking the amount of current memory (in case you don't know!)

Besides the RAM-disk, spooler, and timer software, Tecmar supplies 20 special utilities.

to setting the address jumpers for loading address lines and configuring the serial ports. (Unfortunately, the drawings and diagrams get a little confusing here—but then a little trial and error can be educational.) A DIP switch controls memory settings, and jumper blocks configure port names and addresses as COM1 or COM2 and LPT1 or LPT2. You can add memory chips in increments of 64K, using sets of nine 6164 chips (the ninth for parity checking).

As is often the case with manuals, it is difficult to tell which audience this one is written for. To take one example, while four pages of text and drawings explain how to remove the PC's cover, only half a page is devoted to setting the jumpers for interrupt request lines. However, the instructions are generally quite good and include addresses of all important I/O ports, cable wiring diagrams, circuit diagrams, and a couple of sample BASIC programs demonstrating how to use the clock/calendar. Given the complexity of the procedures, the beginner should give the manual a very thorough reading before attempting the installation.

Name of board Captain

Manufacturer
Tecmar, Incorporated
Personal Computer Products Division
6225 Cochran Rd.
Solon, OH 44139
(216) 349-0600

Price
\$349 with zero RAM, external serial port (25 pin), internal parallel port (cable supplied), and clock/calendar with battery; \$795 with 384K RAM and PAL logic chip; security system, additional \$300

Cost of additional RAM
\$100 per 64K

Parity checking available?
Yes

Number of serial ports
One, either Com1 or Com2

Number of parallel ports
One

Battery backup?
Yes

Type of battery
Lithium

Software compatible with DOS?
Yes, 2.0 and above

Number of drives emulated
One

RAMdisk installable as DOS 2.0 device driver?
No

Can user select memory occupied by RAMdisk?
Yes

Minimum/maximum size of each RAMdisk "drive"
64K/380K

Print spooler provided?
Yes

Variable print spooler size?
Yes

Supplementary programs
Set of general utilities (*Treasure Chest*)

Software Riches

The Captain board comes with a disk containing RAMdisk software (MEMDISK), a spooler program (PRINTER), and the usual clock/calendar maintenance program (DOSTIME and SETTIME). MEMDISK allows the creation of either a single- or double-sided RAMdisk with a maximum of 360K. The RAMdisk program must be installed after DOS is loaded and is not a part of the CONFIG.SYS file as a device driver.

Both MEMDISK and the printer spooler allow you to specify the amount of RAM to be left in the system when invoking either of these programs. Your own software can access the interrupts generated by the clock/calendar function for special applications. A selection of interrupt addresses lets you use time interval signals ranging in frequency from once per month to every tenth of a second.

Besides the usual RAMdisk, spooler, and timer software, Tecmar supplies a group of 20 utility programs that generate form letters, maintain checking accounts and name and address files, and play three-dimensional tick-tack-toe. These programs (collectively called *Treasure Chest*) (See "Free Treasure," PC, Volume 3 Number 18) are keyed to access a particular address on the multifunction board and will not run unless the Captain is installed in the system.

Treasure Chest contains an interesting utility called CRON, which keeps track of messages and system time to flash reminders at preset times of day or even preset calendar dates. Another program called BANNER flashes messages sideways on the screen in large Gothic letters. *Treasure Chest* certainly fills its function of an attractive lure to potential buyers of the Tecmar board.—Peter Feldmann

VISTA MULTI CARD PLUS—AND MINUS

The Multi Card Plus from Vista Computer Company is an undistinguished, straightforward multifunction card. It offers up to 384K RAM; one serial, one parallel, and one game port; and a real-time clock/calendar. The hardware, software, and documentation for this product are certainly adequate, but they don't deserve any higher praise.

Seven jumpers must be set before installation; there are no switches on the

card itself. Although Vista's manual explains the necessary settings clearly enough, switches would have made the task simpler and more convenient. The parallel connector is on the rear panel, and ribbon cables are provided for the serial and game ports. However, the board doesn't supply an extra rear panel insert or connector panel.

The onboard battery is an odd-looking one that I have never seen before. According to the manual, this battery is a rechargeable nickel-cadmium type—a fine idea in theory because it may never need replacement. Unfortunately, however, the battery on my sample board already showed signs of leakage—slight corrosion and residue on one surface—which

Name of board
Multi Card Plus

Manufacturer
Vista Computer Company, Inc.
1317 E. Edinger
Santa Ana, CA 92705
(714) 953-0523

Price
\$310 with zero RAM, serial port, parallel port, clock/calendar, and disk emulator;
\$685 with 384K RAM and game port

Cost of additional RAM
\$60 per 64K

Parity checking available?
Yes

Number of serial ports
One

Number of parallel ports
One

Battery backup?
Yes

Type of battery
Nickel-cadmium

Software compatible with DOS?
Yes, 1.1, 2.0, and above

Number of drives emulated
One

RAMdisk installable as DOS 2.0 device driver?
Yes

Can user select memory location occupied by RAMdisk?
Yes, by adjusting system switches

Minimum/maximum size of each RAMdisk "drive"
DOS 1.1: 0/576K; DOS 2.x: 0/768K

Print spooler provided?
Yes

Variable print spooler size?
Yes, 1K to 62K

Supplementary programs
Clock-managing facility

REVIEWS

most likely could indicate future problems. Although the battery is held on the board with a very tight connector, I believe it would be possible to replace it if necessary.

Overall, the construction quality of the board is only fair. Soldering is somewhat spotty and inconsistent, and the general

size for different applications and circumstances would require opening the PC and resetting the switches. The only benefit of this scheme is that data stored on the RAMdisk aren't lost when the PC is reset.

DYNAdisk can also access memory in the otherwise unavailable 192K RAM block located above the video area. Because a PC-XT doesn't have the same switching capabilities as a PC, a program called DOSIZE sets the amount of memory devoted to RAMdisk, but then the contents are lost with a boot.

Print Buffer

The DynaSPool print buffer is limited to a maximum buffer size of 62K RAM. Up to three distinct spoolers can be active simultaneously, but the manual indicates that DynaSPool works only with the three parallel printer ports.

The clock/calendar is controlled by two programs, a BASIC program, which sets the clock, and a .COM file, which can be included in AUTOEXEC.BAT to set the system date and time when the computer is started. Though it's good to have the source of the setting program, it seems chintzy of Vista not to provide a compiled version to make using the program easier. The program looks like one I used years ago on an S-100 clock board. Also, it was almost amusing to discover that the program calculated the day of the week incorrectly.

Though I can't give this product high marks, everything worked well enough (other than the bug in the calendar program). The package isn't bad, and it's priced slightly lower than several competitive products with similar features. But I think you can do better elsewhere for a bit more money.—Glenn A. Hart

QUADRAM QUADBOARD: A TOP SELLER

The original QUADBOARD from Quadram Corporation was one of the first multifunction expansion boards available for the IBM PC, and its high quality stimulated brisk sales. In its latest incarnation, the QUADBOARD is still a top seller, and for good reason. With its 384K of RAM, three ports (serial, parallel, and game), and a powerful set of software tools, it's undoubtedly one of the better boards around.

Nonetheless, the QUADBOARD and its software do have some annoying quirks and omissions that are especially disappointing in a product that comes so close to being excellent. For example, while the installation instructions are generally clear and easy to follow, the manual neglects to provide any instructions for setting the switches on the system board. Instead, it refers you to the *IBM Guide to Operations*. That would be merely inconvenient, unless, like me, you have an early-model PC with only 64K on the system board; *The Guide to Operations* for this machine tells you only how to set the switches for up to 256K of internal memory. So, to install a 384K board such as the QUADBOARD, you have to look elsewhere for information.

I called the Quadram technical service department, where the phone rang interminably before I gave up for the day. The following day, a polite service rep gave me the necessary instructions. It was an annoying delay that would have been avoided if Quadram had included the

Though I can't give the Multi Card Plus high marks, everything worked well enough, and it's priced lower than several competitive products.

appearance is a cut below many of the other boards reviewed in this project.

Uninspired Software

Moreover, the software supplied by Vista seems uninspired to me. The RAMdisk program, named DYNAdisk, works with DOS 1.1 by patching the IBMIO.COM hidden file and with DOS 2.x as a device driver installed through CONFIG.SYS. On a PC, the size of the RAMdisk is fixed by setting the PC motherboard memory switches to indicate less memory than is actually installed. The balance above the set memory will be used by DYNAdisk.

This method is cumbersome and awkward, because changing the RAMdisk

information in the manual.

I ran into another hitch when I mounted the parallel and game ports on my PC. Quadram provides a neat little bracket that hangs on the back of the PC's chassis, with holes for the I/O ports. Unfortunately, in order to attach the ports to the bracket, you have to reach inside the narrow

QUADBOARD is a top seller—for a good reason; it's one of the better boards around.

bracket to maneuver a tiny nut onto an equally tiny screw. I finally succeeded, after numerous tries, by using a pair of long-nosed pliers to drop the nut on top of the screw. I felt like a klutzy doctor trying to do microsurgery with the wrong tools. Why couldn't Quadram have attached the ports to the bracket at the factory?

Despite these initial difficulties, there's a lot to like about the QUADBOARD. The hardware works like a charm, and the software has almost all the features I could ask for in RAMdisk and print buffer programs.

Packaged together in a program called QuadMaster II (QM2 for short), the programs can be controlled either by menu or by a command line. So, if you don't want to remember a bunch of arcane commands, you can use the menu. If you want to invoke the programs in a batch file, you can use a command line.

The size of the QM2 RAMdisk can be varied from 32K (36K for DOS 2.0 and above) up to 320K (360K for DOS 2.0).

QM2 lets you install up to four RAMdisks, but, because DOS will only recognize a total of four drives, systems that have two real floppy drives will be limited to two electronic drives.

An unusual and useful feature of the QuadMaster II RAMdisk is that its contents can survive a system reset (Ctrl-Alt-Del). This does have some drawbacks, however. The feature only works if you invoke QM2 from the keyboard, not from an AUTOEXEC file. And if you include other drivers, such as the DOS MODE command, in your AUTOEXEC file, you may freeze up your system when you initiate the system reset. The QM2 manual warns of this problem, noting that QM2 must be installed before other drivers. Getting this feature to work well can be a

bit complex, but if you do a lot of system resets, it might be worth the effort.

The QuadMaster II print buffer—one of the nicest ones I've seen—is just loaded with useful features. For example, if the paper jams, you can halt printing by pressing the Alt-NumLock key combination, even while you're using an application program. You can then restart printing by pressing Alt-NumLock again. When you return to the DOS prompt, you can tell the buffer to back up or go forward a certain number of lines or pages. And you can clear the buffer entirely. Like the QM2 RAMdisk, the print buffer contents can survive a system reset if you invoke QM2 from the keyboard.

Unfortunately, the print buffer does have one major failing: it only works with

Name of board QUADBOARD

Manufacturer
Quadram Corporation
4355 International Blvd.
Norcross, GA 30093
(404)923-6666

Price
Zero RAM, \$325; 384K RAM, \$795

Cost of additional RAM
\$95 per 64K

Parity checking available?
Yes

Number of serial ports
One

Number of parallel ports
One

Battery backup?
Yes

Type of battery
Rechargeable nickel-cadmium

Software compatible with DOS?
Yes, 1.1 and 2.x.

Number of drives emulated
Up to four, including physical drives. (Thus, if you have two disk drives, you can have two RAMdisks.)

RAMdisk installable as DOS 2.0 device driver?
No

Can user select memory occupied by RAMdisk?
No

Minimum/maximum size of each RAMdisk "drive"
DOS 1.1: 32K/320K; DOS 2.x: 36K/360K

Print spooler provided?
Yes

Variable print spooler size?
Yes

Supplementary programs
None

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parallel printers. Although the QM2 manual is not too clear on whether the buffer works with serial printers, I got an unequivocal no from a technical support rep at Quadram. So, you folks with serial printers are out of luck.

In addition to the RAMdisk and print buffer, QM2 includes something extra—a disk cache. The disk cache is an area of memory where QM2 will store the last information read from your disks. If your programs do a lot of reading from disk, the disk cache can speed up your work. For instance, my PC took 3 minutes and 45 seconds to sort a 46K *dBASE II* file. Using the disk cache, it took only 2 minutes and 35 seconds. While this was still slower than using my RAMdisk (which needed only 1 minute and 29 seconds), it was also easier. Once I had configured the system, assigning memory to the disk cache, I did my work in the usual way, without having to copy any files to and from the RAMdisk. Because the disk cache performs automatically, it has an edge over the RAMdisk.

Overall, the Quadram QUADBOARD

The QUADBOARD is a good product whose few failings probably won't get in your way.

is a good product with a few failings that keep it from being great. But if you use a parallel printer and don't mind a little confusion when you install it, the weaknesses probably won't get in your way.

—Dara Pearlman

TALL TREE'S JRAM-2 STANDS ABOVE THE REST

Ever since the first PC rolled off IBM's assembly lines, there has been much debate as to how much memory the 8088 could efficiently use. The PC-1 was configured to handle 544K, but some software fudging enables access to extra memory secreted between that reserved for the video adapters and ROM at the "top end." The PC-2 and XT both have a memory rating of 640K—quite a hunk of memory, but still not enough for some. Now, 256K-bit chips are on the market, yielding potentially huge blocks of RAM. But can the PC handle memory in megabytes instead of kilobytes?

RAM Explosion

Tall Tree Systems is a pioneer in the RAM explosion, offering megabyte-size memory. Its JRAM-2 multifunction board is available as a basic memory board that can be expanded with add-ons, or as a more complete board with a clock/calendar and serial and parallel port modules attached. The board itself is sturdily constructed with high-quality components. It can handle a mix of 64K- and 256K-bit chips; provided that all nine chips in each bank are the same size. Since one JRAM-2 board can hold up to eight banks of chips, this yields a total of 2 megabytes of memory per board. With the accompanying *JETDRIVE* RAMdisk software, up to eight boards can be combined to produce a total system memory of 16 megabytes—which will accommodate a pretty good-size spreadsheet. Also, *JETDRIVE* han-

dles memory checking and sizing automatically.

Software Excellence

The huge memory capacity of this board already sets it apart from the crowd, but the excellence of the accompanying software makes this system even more unique. JSPOOL is a spooler package that provides software control of up to seven

Tall Tree Systems is a pioneer in the RAM explosion; its JRAM-2 offers megabyte-size memory.

printers and has enough features to fill a 40-page manual. JSPOOL formats text while it is being printed and allows for instant pause, paging, and buffer flush control from the keyboard.

One of the drawbacks of using large amounts of memory as a RAMdisk is the volatility of that memory. If a fuse blows while you have 2 megabytes of data on the RAMdisk, you will permanently lose the data. Emergency power backup systems eliminate part of the problem, but JRAM-2 supplies a software solution. *JET.COM*, a file transfer utility, speeds up the data backup process by a factor of two or three over the normal copy time. It can copy files selectively to or from a RAMdisk, has no trouble reading path names, and can even create new subdirectories on hard or floppy disks while copying. It can restore hard disks, check file dates, and

archive bits to pick and choose among the files to be backed up.

The **JETDRIVE** RAMdisk software package—which is also sold separately and will run with other memory boards—contains a useful memory control device driver called **JBOOT**.

JBOOT allows memory to be allocated in three major categories: system memory for DOS, memory for a RAMdisk, and spare memory for loading machine language programs and data. A new interrupt is generated that takes over from DOS to handle system resets. Pressing the Ctrl-Alt-Del combination triggers a warm boot that preserves the contents of the RAMdisk. The Ctrl-Alt-Minus combination triggers the normal system reset while preserving the RAMdisk 90 percent of the time. The Ctrl-Alt-K combination "kills" the system, the equivalent of switching the PC off and then on again. This command allows a complete rechecking and resetting of the system memory without subjecting the computer to the electronic shock that normally accompanies a complete power-down. Parity and divide-by-zero errors are also caught by **JBOOT**, giving the user a chance to copy the contents of the RAMdisk to a floppy disk before resetting the system.

The **JRAM-2** manual is well written. The many options available (for example, up to eight serial port addresses are provided) make a one-time-through reading experience rather frustrating, although it's easier the second time. There are plenty of diagrams to show switch and port positions, as well as sections on how memory works and how to wire custom cables.

The **JRAM-2** manual has another distinctive feature: unlike some other board makers, Tall Tree advises users to purchase the least expensive RAM chips

available. The theory is that bad chips (if any) will show up in the first 48 hours of use and can easily be replaced at a total cost still far below the purchase price of the more expensive pretested types.

How It Works

While **JRAM-2** offers megabytes of memory and a myriad of features, the fact remains that the 8088 chip can address only one megabyte of memory, and some of that is reserved for video, ROM, and other functions. So how does the **JRAM-2** board work? It uses a technique called paging or bank switching that leaves most of the memory in electronic limbo or suspended animation. Data is read or written

only when its "page" is called up by the driving software, which keeps track of the location and content of each bank of memory. This arrangement means that literally megabytes of text or graphics could be kept ready for almost instant display on the screen, for creating animation and other effects. A RAMdisk emulator is a natural for using this vast amount of memory, and with Tall Tree's **JETDRIVE** software, an emulated disk drive reaching into the 10-megabyte range is now a reality.

The combination of 256K-bit chip compatibility and memory paging software makes the **JRAM-2** board one of the most advanced multifunction boards on the market today. —Peter Feldmann

Name of board
JRAM-2

Manufacturer
Tall Tree Systems
1032 Elwell Court #124
Palo Alto, CA 94303
(415) 964-1980

Price
\$219 for basic board; \$399 with zero RAM, clock/calendar, serial port, and parallel port; \$799 with 512K RAM

Cost of additional RAM
\$50 per 64K

Parity checking available?
Yes

Number of serial ports
One; a second is optional

Number of parallel ports
One, optional

Battery backup?
Yes

Type of battery
Lithium

Software compatible with DOS?
Yes, 2.0 and above

Number of drives emulated
As memory allows

RAMdisk installable as DOS 2.0 device driver?
Yes

Can user select memory occupied by RAMdisk?
Yes

Minimum/maximum size of each RAMdisk "drive"
64K/15.8 M

Print spooler provided?
Yes

Variable print spooler size?
Yes, from 1K on up

Supplementary programs
JETDRIVE, spooler (which provides many options)



REVIEWS

SEATTLE'S RAM+6: FEW FLAWS

Seattle Computer is best known as the original author of MS-DOS and PC-DOS. This reputation is ironic, since the company is primarily a hardware manufacturer of advanced 16-bit plug-in boards. In fact, its 16-bit DOS was written solely because an operating system was needed for Seattle's then-novel hardware designs. The later purchase of the Seattle DOS by Microsoft is widely known, but Seattle Computer never succeeded in obtaining the recog-

nition it rightfully deserves.

Seattle Computer continues to produce high-quality boards for IBM-compatible computers. This company's RAM+6, a rather standard multifunction card, offers up to 384K RAM, a serial and a parallel port, a battery-backed clock/calendar, and an optional game port (which sells for \$25).

Unusal Elegance

The board itself is unusually well constructed and elegant. Sockets are used for all chips (although I discovered that not every chip was adequately seated in the sample board), and component quality seems high. The serial port connector is on the rear panel, and ribbon cables are used

for the parallel and game ports. Seattle provides extra rear panel inserts and hardware for the parallel and game ports, but the connectors alone would use up three slots, since no multiconnector bracket is supplied.

I had some trouble installing the board in a standard 256K motherboard IBM PC. The Seattle documentation gives inaccurate switch settings for the PC motherboard, which result in incorrect memory sizing when checked with CHKDSK. I had to turn to the instructions in the IBM *Guide to Operations* to gain correct access to the 384K RAM installed on my sample board. Nonetheless, Seattle did provide good instructions for setting the onboard switches for I/O operation, which allow you to adjust the addresses of the serial and parallel ports. A useful RAMTEST utility was included to check the RAM+6 memory. All memory checked out OK, and the various I/O ports worked well.

Pluses for DOS 2.x Users

The RAM+6 comes with clock/calendar, RAMdisk, and spooler software. The RAMdisk program can simulate only one disk drive, but the size of the RAMdisk is not limited to the DOS 360K floppy maximum. Installation varies depending on whether you use DOS 1.1 or 2.x. The procedures for DOS 1.1 modify the hidden IBMBIO.COM file by installing a new I/O system. The DOS 1.1 FLASH DISK RAMdisk utility works only on a PC with floppy disks; if a hard disk has been patched into DOS 1.1, the Seattle RAMdisk won't work.

To determine the size of the RAMdisk, you set the motherboard switches on the PC to indicate less memory than is actually installed; FLASH DISK will then use the balance.

Name of board

RAM+6

Manufacturer
Seattle Computer
1114 Industry Dr.
Seattle, WA 98108
(206) 575-1830

Price
\$195 with zero RAM, serial port, parallel port, clock/calendar, print spooler, and flash disk; \$485 with 384K RAM and additional game port

Cost of additional RAM
\$45 per 64K

Parity checking available?
Yes

Number of serial ports
One

Number of parallel ports
One

Battery backup?
Yes

Type of battery
Lithium

Software compatible with DOS?
Yes, 1.1, 2.0, and above

Number of drives emulated
One

RAMdisk installable as DOS 2.0 device driver?
Yes

Can user select memory location occupied by RAMdisk?
No

Minimum/maximum size of each RAMdisk "drive"
0/576K

Print spooler provided?
Yes

Variable print spooler size?
Yes, 1K to 64K

Supplementary programs
No

Installation of the clock and RAMdisk software is much simpler with DOS 2.x. The Seattle Computer utilities are "installable" device drivers, meaning that they are loaded with DOS through the CONFIG.SYS file that DOS examines at start up. The size of the RAMdisk is specified in CONFIG.SYS.

FLASH PRINT, the Seattle print spooler, is also installed via CONFIG.SYS, so it works only with DOS 2.x. It is more flexible and sophisticated than the spooler programs supplied with most multifunction boards. You can assign the buffer to any legitimate output port (LPT1-3 or COM 1-2), but it does have a ceiling of 64K. (Seattle Computer indicates it may raise this ceiling in the future.)

Unique Buffer Feature

Once the spooler is operative, you can use a convenient utility called BUFFER to find out how many characters remain to be printed, clear the buffer, and reassign the buffer to any other output port. A unique feature I have not seen before allows you to adjust the "priority" assigned to the buffer—that is, the amount of time the computer will devote to outputting characters from the FLASH PRINT buffer instead of executing the normal program. Increasing the priority value can optimize the performance of specific applications programs, such as *WordStar*.

The RAM+6 is a well-constructed board with good software, and it works especially well with DOS 2.x. The documentation needs work, but it's the only flaw in an otherwise fine package. For such good performance, the price is also surprisingly low. Overall, RAM+6 is a product worthy of serious consideration. —Glenn A. Hart

BABY BLUE II: CP/M AND RAM TOO

Microlog's BABY BLUE II multifunction board has two distinctive features: The actual circuit board is brilliant blue, and centered on the board is a Z-80 microprocessor and supporting chips.

The Z-80 is capable of running CP/M software from a variety of sources. The

BABY BLUE II includes two serial ports—an external RS-232 25-pin plug on its mounting bracket and another mounted internally near the parallel port. Besides the lettering J3 and J2, the internal ports look alike, and you must read the manual carefully to avoid connecting a parallel device to a serial outlet.

The RAM banks are socketed in four rows of eight rather than nine chips per 64K bank. This means, unfortunately, that parity checking is not available for this memory. Of the 256K total, one bank of 64K is factory-configured to lie at page E in segment memory; the remainder are

Name of board

BABY BLUE II

Manufacturer

Microlog
222 Route 59
Suffern, NY 10901
(914) 368-0353

Price

\$695 with clock/calendar, parallel port, two serial ports, and Zilog Z-80 co-processor chip with 64K RAM (for Z-80); \$995 with additional 192K RAM system memory

Cost of additional RAM

Not available

Parity checking available?

No

Number of serial ports

Two

Number of parallel ports

One

Battery backup?

Yes

Type of battery

Lithium

Software compatible with DOS?

Yes, 2.0 and above

Number of drives emulated

As memory allows

RAMdisk installable as DOS 2.0 device driver?

Yes

Can user select memory occupied by RAMdisk?

No

Minimum/maximum size of each RAMdisk "drive"

User specified. Device driver is written by RAMDISK.COM

Print spooler provided?

Yes

Variable print spooler size?

Yes, up to 63K

Supplementary programs

Modem software, terminal emulation software, on-line help file, CP/M conversion, and system software



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allocated immediately above the RAM on the system board, yielding an addition of 192K to RAM.

BABY BLUE II's manual devotes 22 pages, none of it easy reading, to the allocation of memory banks. Port addressing and memory banks may be a bit esoteric but the lack of good illustrations and the sloppy organization make this section extremely difficult to read, even the third time around. A good index would have helped considerably.

The Software

To operate, both the spooler and RAM-disk programs rely on installable device drivers placed in the PC's CONFIG.SYS

Microlog's BABY BLUE II has two distinctive features: The circuit board is brilliant blue and centered on the board is a Z-80 microprocessor and supporting chips.

file. The RAMDISK.COM program on the accompanying diskettes prompts you to enter the size and name of the device driver. It then creates the appropriate program, which flashes the message RAMDISK INSTALLED to the screen during bootup, and loads the RAMdisk to any size you specify. Separate drivers can be

created and loaded consecutively to install several RAMdisks, depending on available memory.

The spooler driver provided with the review board did not function. When I called, Microlog said that a new spooler driver that can handle a total of 63K divided up into up to four separate sections is now available. The new spooler supposedly supports as many as three ports simultaneously with help from the Z-80 coprocessor.

Running CP/M

Of course, BABY BLUE II's ability to translate and run CP/M software on the PC is its most important feature. Though a thorough testing of this capability is beyond the scope of my review, I translated and ran several simple CP/M programs. The software attaches a header file to the CP/M version, which increases its size by about 10K and converts it to a COM-type file.

Provisions are also made to edit and then strip the header from the program to convert it back to true CP/M format. The BABY BLUE II also includes software for a smart terminal emulator able to transmit and receive programs and reassign keys to enable the PC to emulate the Televideo 950 or the Hazeltine 1500.

CP/M, a pioneering operating system for micros, has a vast catalog of software. BABY BLUE II opens a convenient door to the CP/M library of programs to users already familiar with CP/M. Because of the inevitable compromises made to accommodate the Z-80, the BABY BLUE II is not the best choice for a standard multifunction board, but the intermediate or advanced PC user who needs CP/M compatibility may find it in this board.—Peter Feldmann

THE ORCHID BLOSSOM: A HOST TO PCNET

The Blossom multifunction card from Orchid Technology offers the usual options: up to 384K RAM, one serial and one parallel port, and a battery-backed clock/calendar. But its ability to host an optional PCnet daughterboard and its software set it apart from its competition.

The PCnet daughterboard is Orchid's entry into the Local Area Network (LAN) fray. Blossom, a middle-of-the-road product in terms of both performance and price, isn't as fast as Ethernet and some other high-powered LAN's. But it doesn't cost as much either. (PC is now testing a variety of LANs, including PCnet. Watch for this series of reviews if you're interested in networks.) Moreover, if you use the optional PCnet board, you save both cost and expansion-slot space.

As a "straight" multifunction board, the Blossom is rather ordinary, except for its software. Installation is easy; one four-position switch tells the Blossom how much memory is installed on the PC motherboard, and then you're ready to go. Unfortunately, you can't add a game port or a second serial port, but the two ports that are provided work well. The serial port connector appears on the rear panel, and a single ribbon connector brings out the parallel port. Orchid also provides jumpers if you need to move the addresses of the I/O ports. The documentation clearly explains the switch and jumper settings for the Blossom, PC, and PC-XT.

The Orchid software package includes some interesting and unique programs.

The *PCnetDrive* RAMdisk software is installed as a device driver in *CONFIG.SYS* and works only with DOS 2.0 or higher. It can configure up to four electronic disks, each of which can be as large as available memory permits. *PCnetDrive* displays an informative message when the system is booted and requests confirmation when a reboot is instigated after files have been moved to RAMdisk. This nice feature allows you to abort the reboot and save RAM files to permanent storage.

The *PCnetSpool* spooler appears to be identical to AST's spooler. In fact, since the manual indicates the spooling software is licensed, this may be the case. It is a good spooler: you can redirect output, set communications parameters for serial printers, and set the memory reserved for spooling to any value consistent with available memory or to either all available memory or all memory after leaving a specified amount for applications programs. Other options can stop spooler output and restart printing at the top of either the current or the previous page.

Blossom offers an unusual set of programs that implement intelligent disk buffering of specified disk drives. Performance of many classes of applications programs can be enhanced by such buffering, which is not exactly the same as the *BUFFERS* option that can be installed in DOS 2.x. The Orchid version features variable cache sizes limited only by the available memory, the automatic buffer flushing in the background with a user-selectable flush delay, the automatic floppy disk change detection, and a memory-resident file-allocation table for greater speed.

The disk caches are set with a command line, which can be included in *AUTOEXEC.BAT*. Utilities are provided

to display the status of the cache system, to flush "dirty" buffers (those that must be, but have not yet been, written to disk), and to reset all cache buffers.

Finally, the Orchid clock/calendar is controlled by a device driver, which must also be installed into the *CONFIG.SYS* file. I thought it was strange that DOS still requests the time and date after the driver is installed, but the suggested values have in fact been loaded from the Blossom. Orchid provides two other useful time/date utilities. *SETALARM* sets up to three distinct alarm times. The first is stored in the clock chip, so it is not lost when the system is powered down. The other two alarm times are lost when power is cut off. The PC speaker beeps when an alarm time

is reached. Another program, *DTIME*, displays the time, date, or the alarm times in the upper right corner of the screen. The display remains visible during DOS operations and when you are using *WordStar*. But with *WordStar*, the display blocks the *LINE SPACING* value on the status line.

I did not test the PCnet daughterboard, but everything else operated well. The disk cache system appeared to speed execution significantly on several programs that did a lot of disk accessing, and I had no problems with data integrity. The Blossom will probably be the preferred multi-function board for PCnet users, but I believe it is a viable option for others as well. —Glenn A. Hart

(continued)

Name of board

Blossom

Manufacturer

Orchid Technology
47790 Westinghouse Dr.
Fremont, CA 94539
(415) 490-8586

Price

\$295 with zero RAM, serial port, parallel port, clock/calendar, disk-caching software, RAMdrive, and print spooler;
\$795 with 384K RAM

Cost of additional RAM

\$75 per 64K

Parity checking available?

Yes

Number of serial ports

One

Number of parallel ports

One

Battery backup?

Yes

Type of battery

Lithium

Software compatible with DOS?

Yes, 2.0 and above

Number of drives emulated

Four

RAMdisk installable as DOS 2.0 device driver?

Yes

Can user select memory location occupied by RAMdisk?

No

Minimum/maximum size of each RAMdisk "drive"

0/As memory allows

Print spooler provided?

Yes

Variable print spooler size?

Yes, as memory allows

Supplementary programs

Time/date utilities, intelligent disk buffering

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STB RIO PLUS II: DOUBLE SERIAL FUN

The RIO PLUS II, STB System's enhanced version of its year-old multifunction board, is the only 384K RAM, single-card multifunction board to offer two serial ports (one standard, one optional) plus the usual parallel port, game port, and clock/calendar.

The board is reasonably well built, with sockets for the memory expansion chips but not for most other chips. Instead of a flat lithium battery, it uses a standard AA

penlight battery inserted in a holder that can be taped to the PC's back panel. Anyone who has had to make a special trip to locate a lithium battery will agree that this is a convenient design.

Four ribbon cables connect the serial, parallel, and game ports to the back panel. The on-board connectors and the cables are keyed so that they cannot be inserted incorrectly. You can connect the cables to a small bracket that comes with the board and screws onto the PC's back panel. This considerate touch makes for a neat installation.

Setting up the board is easy. STB includes very clear and straightforward instructions for configuring both the RIO PLUS II and the host PC. You only have

to set one 8-position switch, which is located on the top portion of the board, making it accessible even after the board has been installed—another nice touch.

In the Software Fast Track

As good as the RIO PLUS II hardware is, perhaps the best part of the system is STB's *PC Accelerator* software. I have

STB provides very clear instructions for configuring both the RIO PLUS II and the host PC.

used this excellent package with another popular multifunction board (it works with many cards other than STB's own) and have always been impressed with its capabilities. Its RAMdisk provisions can establish either one or two RAMdisks of any size up to 360K. Most importantly, *PC Accelerator* does not necessarily wipe out the contents of the RAMdisk when you reboot. The normal Ctrl-Alt-Del combination reboots the system while retaining the contents of the RAMdisk; the Ctrl-Alt-Ins combination performs a reboot that clears the RAMdisk contents. This is a wonderful feature—just ask anyone who has inadvertently rebooted without saving a RAMdisk on a floppy.

PC Accelerator also has a very good spooling function. During spooling, a three-keystroke combination can interrupt printing or clear the buffer. The program handles the clock/calendar on the RIO PLUS II in the usual fashion.

Other enhancements are built into *PC Accelerator*. For instance, you use the

Name of board

RIO PLUS II

Manufacturer

STB Systems, Inc.
601 N. Glenville, #125
Richardson, TX 75081
(214) 234-8750

Price

\$395 with 64K RAM, parallel port, serial port, clock/calendar, game port, and *PC Accelerator* software; \$895 with 384K RAM and second serial port.

Cost of additional RAM

\$90 per 64K

Parity checking available?

Yes

Number of serial ports

One; a second is optional

Number of parallel ports

One

Battery backup?

Yes

Type of battery

Standard AA

Software compatible with DOS?

Yes, 1.1, 2.0, and above

Number of drives emulated

One

RAMdisk installable as DOS 2.0 device driver?

No

Can user select memory location occupied by RAMdisk?

Yes, with *PC Accelerator*

Minimum/maximum size of each RAMdisk "drive"

48K/360K

Print spooler provided?

Yes

Variable print spooler size?

Yes, 1K to 64K

Supplementary programs

None

PrtSc key, rather than the clumsy Ctrl-NumLock combination, to make the system pause. You can also turn the video display on or off without affecting program execution; this can save power and wear-and-tear when running a long program or when the computer won't be used for a while but you'd rather not turn it off. A separate utility program provides still more features, including an overall system status report and a printer switch that can exchange LPT1 and LPT2. I did not test *PC Accelerator's* capacity to access memory above the PC's normal 640K RAM limit. You can allegedly set the RIO to address its memory in nonstandard locations, allowing over 800K RAM to reside in the system. Memory over 640K can be used for the RAMdisk or spooler but not for program execution.

PC Accelerator's easy installation program merely requires you to answer a few questions. The program first copies the relevant files and then creates a suitable AUTOEXEC.BAT file.

My tests of the RIO PLUS II revealed nothing surprising. The board worked as soon as it was plugged in, all memory checked out fine, and all the I/O ports worked as claimed. The *PC Accelerator* software is great, especially its ability to retain RAMdisk files after a reboot. STB is a solid company; I have evaluated its video boards favorably in *PC*. Further, the RIO PLUS II is the only way to get two serial ports on a single multifunction card. The base price of the RIO PLUS II is reasonable, but STB's prices for extra memory are a bit steep. If you buy this package and the memory prices haven't dropped, consider installing the extra memory yourself. The end result will be an excellent card with unusually good software at a bargain price. —Glenn A. Hart

APSTEK HANOI-1 PLUS: NO SUPERHERO

Aside from its colorful ads depicting the adventures of "Handi-Man, The Man from Apstek," there isn't much that's memorable about Apstek's entry in the multifunction-board sweepstakes. In the ad, HandiMan is a dead ringer for Superman, but Apstek's HANOI-1 PLUS multifunction board is a lot more like Clark Kent—a mild-mannered fellow who does his job but doesn't stand out from the crowd.

The HANOI-1 PLUS offers the standard multifunction board features at a pretty standard price. You get up to 384K of RAM, parallel and serial ports, a clock/calendar, and software for creating RAMdisks and print buffers. Its one claim to fame is that it doesn't use any internal ribbon cables. Both the serial and parallel ports fit into the expansion-slot opening in the back of the PC's chassis. The printer cable connects directly to the HANOI-1 PLUS port, while you use an intermediate cable (provided by Apstek) to make any serial connections.

There's not much in the package to make the HANOI-1 PLUS a better-than-average value. The manual, for example, is adequate but not outstanding. On some

Name of board
HANOI-1 PLUS

Manufacturer
Apstek, Inc.
2636 Walnut Hill Lane #335
Dallas, TX 75229
(214) 357-5288

Price
\$305 with zero RAM, parallel port, serial port, clock/calendar, and RAMdisk/print buffer software; \$895 with 384K RAM and game port (\$885 without game port)

Cost of additional RAM
\$90 per 64K

Parity checking available?
Yes

Number of serial ports
One

Number of parallel ports
One

Battery backup?
Yes

Type of battery
Lithium

Software compatible with DOS?
Yes, 1.1 and 2.x

Number of drives emulated
Two

RAMdisk installable as DOS 2.0 device driver?
No

Can user select memory occupied by RAMdisk?
No

Minimum/maximum size of each RAMdisk "drive"
1K/360K (320K under DOS 1.1)

Print spooler provided?
Yes

Variable print spooler size?
Yes

Supplementary programs
None

REVIEWS

crucial points it refers the reader to the IBM *Guide to Operations* for clarification. Even more bothersome, the instructions for running the software do not appear in the printed manual, but instead reside on text files included on the program disk. While that may be acceptable in public-domain and user-supported software, it's pretty shoddy in a commer-

More like Clark
Kent than
Superman,
the Handi-1 Plus
does its job but
doesn't stand out
from the crowd.

cial package. It also can lead to a mix-up. If you follow the printed instructions to install the hardware and then look at the instructions on the disk, you'll discover that you have to reopen the chassis to set more switches before you can run the RAMdisk program.

The software, too, is nothing out of the ordinary. Apstek's RAMdisk program—called Xtra Diskette, or Xtradisk—doesn't have any fancy options. In fact, with DOS 2.0, it's a bit more cumbersome than most RAMdisk programs. To install an Xtradisk, you type in XTRADISK at the DOS prompt and then the desired RAMdisk size (in kilobytes). With DOS 1.1, the installation process ends there, but if you're using DOS 2.0, you'll find that something strange has happened. The RAMdisk is several kilobytes short.

If you asked for a 160K RAMdisk,

Xtradisk tells you that your 160K RAMdisk has been created on the D: drive. But the DOS utility CHKDSK will reveal that the "disk" in drive D: has only 143,872 bytes available. What happened?

If you go back to the instructions, you may notice a brief discussion of sectors per track. It seems that Xtradisk creates RAMdisks in the DOS 1.1 style of eight sectors per track. If you want to create a full 160K RAMdisk, you must reformat it to the DOS 2.0 standard of nine sectors per track. The DOS FORMAT utility does allow you to reformat the electronic disk, but this is a nuisance, since FORMAT requires a response from the keyboard, and it's a complicated procedure to set up an AUTOEXEC file with an automatic response. Worse still, the Apstek manual fails to explain this problem fully.

Apstek's print buffer program, Printbuf, does have a few fancy features, but I couldn't get all of them to work. You can clear the buffer with a software command, so you don't have to reset the computer if you want to stop printing in the middle of a run. The manual claims that you can use multiple buffers with multiple printers. I was able to get Printbuf to work with my Epson parallel printer, but I couldn't get it to work with my Qume serial printer. I called Apstek many times, and talked to a friendly technical support representative who tried to solve the problem. We did manage to get BASIC, Printbuf, and the Qume all talking, but we couldn't get Printbuf to buffer the output from *WordStar* or *Volkswriter* when I used the serial printer.

As you can see, the Apstek HANDI-1 PLUS is far from being a superhero among multifunction boards. It has no outstanding strengths, but quite a few weaknesses.—Dara Pearlman

AST RESEARCH'S SIXPAKPLUS: LOTS OF PLUSES

The SixPakPlus could be considered the typical multifunction board. It has the features PC and PC-XT users need most often when upgrading their systems, and installing it is fairly straightforward. AST has configured the SixPakPlus with sockets for 384K of memory. (Although the first bank of 64K-bit chips on the board I tested had been soldered in rather than socketed, AST's current policy is to socket all memory chips.) Those who purchased their PCs before March 1983 must add another memory expansion board to bring their system memory up to the maximum allowable total, since the 384K from the SixPakPlus yields a total of only 448K when added to the maximum 64K of the early PC's motherboard.

The board comes with two manuals punched to fit the standard IBM binder format, but no binder is supplied. An enclosed diskette contains software to set the onboard clock and system date and time, a program to initialize user memory (which works with both the early PC and the one sold after March 1983 but not with the PC-XT), and RAMdisk and spooler programs. I advise reading both manuals thoroughly before you begin to install the board, since the hardware settings of the memory and port addresses will affect the use of the accompanying software.

The instructions for setting memory addresses are fairly easy to understand, even for beginners, but the directions for configuring the serial port are more difficult. As with other multifunction boards,

setting a switch tells the PC how much memory is installed and where it begins and ends. You can set the serial and parallel ports according to the conventional names (COM1: or COM2:, LPT1: or LPT2:) and the usual addresses they use (interrupt address lines IRQ3 and IRQ4). To configure port names and addresses, you must set jumpers on four separate jumper blocks. The location of each block is labeled clearly both in the accompanying drawings and on the board itself.

Advanced users will be pleased with the detailed lists of port and interrupt address lines for both the ports and the clock/calendar functions as well as the technical drawings and circuit diagrams of each part of the SixPakPlus. In addition, a lengthy section covers both serial and parallel cables and information on testing the ports with IBM's diagnostics program. Beginners should plan to spend several hours becoming familiar with both the peripheral devices to be connected to the

The SixPacPlus has the features PC and XT users need most often when upgrading.

SixPakPlus and the possible settings on the board itself.

The serial port interfaces with the board-mounting bracket by means of a standard RS-232C male plug. Both the parallel and game adapter ports require cables that run from blocks on the board and over the rear of the computer between the rear plate and the cover.

Solid Software

SUPERDRV, the RAMdisk software supplied with the SixPakPlus, works with DOS 1.x and 2.x and allows you to specify the size, location, and drive-letter designator of each RAMdisk. To use the RAMdisk options, you either change the system switches or use **DEBUG** to modify DOS according to the total number of drives (both real and electronic). If you do not, DOS will not read or write to the newly created RAMdisks. Drive designators can be switched to allow a RAMdisk to replace the real drive A:. This can be very handy when running an applications program that insists on reading or writing to a particular disk. If you specify the proper

parameters, **SUPERDRV** permits you to load the RAMdisk into high or low memory, while reserving blocks of memory for system use. You can't load the RAMdisk program into DOS as a part of a **CONFIG.SYS** file but must create it after DOS is booted. Thus all RAMdisk data are lost with each system reboot. The many options may seem confusing at first, but plenty of examples demonstrate the best procedures for each type of RAMdisk configuration.

SUPERSPL, the spooler program supplied with SixPakPlus, also gives you a variety of options; you can use it with both parallel and serial printers.

—Peter Feldmann

Name of board SixPakPlus

Manufacturer
AST Research, Inc.
2121 Alton Ave.
Irvine, CA 92714
(714) 863-1333

Price
\$395 with 64K RAM, clock/calendar, serial port, parallel port, and game adapter port;
\$945 with 384K RAM

Cost of additional RAM
\$100 per 64K

Parity checking available?
Yes

Number of serial ports
One

Number of parallel ports
One

Battery backup?
Yes

Type of battery
Lithium

Software compatible with DOS?
Yes, 1.1 and 2.x

Number of drives emulated
As memory allows

RAMdisk installable on DOS 2.0 device driver?
No

Can user select memory occupied by RAMdisk?
Yes

Minimum/maximum size of each RAMdisk "drive"
DOS 1.1: 64K/320K; DOS 2.x: 180K/360K

Print spooler provided?
Yes

Variable print spooler size?
Yes

Supplementary programs
Clock-handling utilities and a memory diagnostic utility

REVIEWS

PROFIT'S ADDRAM PLUS: WITH MULTITASKING SOFTWARE

The ADDRAM PLUS lives up to its name. With its 512K worth of memory sockets (which you fill with banks of 64K-bit chips) PC-1 owners could bring their systems up to full normal memory capacity and have 32K to spare.

The ADDRAM PLUS also comes with either one or two serial or asynchronous

ports and a clock/calendar module. The two serial ports both have external connectors on the board's mounting bracket. One uses the standard RS-232C 25-pin plug, while the other saves space with a 9-pin plug.

The clock/calendar module runs on a nickel-cadmium battery that the PC conveniently recharges each time it's powered up. The board is of good quality and clearly labeled with both switch and jumper block positions for configuration settings. Unfortunately, the installation instructions are somewhat brief and assume some prior knowledge of things such as DIP rocker switches and jumper blocks. They also tend to be confusing at times; for example, a jumper block is described as being "just

left of the battery to the right of the DIP switch." No provision is made for checking errors that might occur during installation, although you should run the standard IBM diagnostics program as a standard precaution. The ADDRAM PLUS is now offered with a 5-year limited warranty.

The Hazards of Multitasking

The RAMdisk software offered with the ADDRAM PLUS board consists of separate programs for DOS 1.1 and 2.x. The DOS 1.1 version runs from the DOS prompt and can be retained in memory during a system reset. You create the DOS 2.0 RAMdisk by the file RAMDISK2.EXE from a menu-driven prompt that asks which disk the system is booted from and the size of the RAMdisk driver you want. You must be careful when using this program, for it overwrites the CONFIG.SYS file currently on the boot drive, replacing it with its own CONFIG.SYS! Two spooler programs are provided, one each for serial and parallel

Name of board

ADDRAM PLUS

Manufacturer

Profit Systems, Inc.
30150 Telegraph Rd.
Birmingham, MI 48010
(313) 647-5010

Price

\$475 with 64K RAM, two serial ports, and clock/calendar; \$1,175 with 512K RAM

Cost of additional RAM

\$100 per 64K

Parity checking available?

Yes

Number of serial ports

Two, one 25-pin, one 9-pin

Number of parallel ports

None

Battery backup?

Yes

Type of battery

Rechargeable nickel-cadmium

Software compatible with DOS?

Yes, 1.1 and 2.0

Number of drives emulated

One drive in DOS 1.1; as memory allows in DOS 2.x

RAMdisk installable as DOS 2.0 device driver?

Yes

Can user select memory location occupied by RAMdisk?

No

Minimum/maximum size of each RAMdisk "drive"

10K/As memory allows

Print spooler provided?

Yes

Variable print spooler size?

Yes, to 63K

Supplementary programs

Multitasking software

One of the
ADDRAM PLUS's
main selling points
is its multitasking
software.

printers. You can vary the size of the spooler between 1 and 63K and start, interrupt, or abort printing with appropriate commands.

A Main Selling Point

One of the ADDRAM PLUS board's main selling points is the multitasking software included in the package. Essen-

tially, multitasking divides the 8088 CPU's time between two or more programs or "tasks." (A print spooler is a simple example of this procedure.) According to the accompanying documentation, the *Taskmaster* software (originally called *Multi-Jab*) allows "two, three, four—up to nine tasks [to run] concurrently." But the effectiveness of *Taskmaster* is limited by its unreliable operation. I ran several programs such as *WordStar*, *dBASE II*, and *1-2-3*; at unexpected moments, the screen and keyboard would lock up, requiring a cold boot to recover.

Another drawback of multitasking is that the 8088 begins to slow down dramatically as soon as it's required to perform more than a relatively undemanding task such as running a printer. Further problems arise because running separate programs simultaneously requires extra "layers" of the disk operating system to be loaded for each task, making heavy demands on the PC's memory. Assuming a memory requirement of 96K per task, running nine tasks concurrently with *Taskmaster* would require a memory complement of 864K—224K more than a PC-2 or XT can run without special bank-switching software. Any device (such as a modem) that makes heavy demands on the 8088's processing time slows down other tasks to a point verging on the ridiculous—for example, the PC may read only one keystroke every 10 to 20 seconds. It is possible to allocate the amount of time used by separate tasks, but with a modem, this approach would lead to problems such as losing part of a transmission. The tendencies of *Taskmaster* to crash or hang up in certain situations make using it hazardous at best. Nonetheless, *Taskmaster* does have its uses, and experimenting with multitasking is interesting.

—Peter Feldmann

APPARAT RAM CARD: FROM THE BARGAIN BASEMENT

If you'd rather shop at K-Mart than at Macy's—if you want to pay a rock-bottom price for a no-frills RAM-disk board—Apparat's RAM Card may be the one for you.

It's hard to beat Apparat's prices. The unit I tested, a fully populated 256K RAM Card, retails for \$341 (or about \$1.33 per kilobyte). Apparat also sells a fully popu-

lated 512K RAM Card for \$637 (\$1.24 per kilobyte).

But for this price, you get only the basics. You get a memory board that plugs neatly into a PC expansion slot and functions as the PC thinks it should. You get SDRIVE, a RAMdisk program that can set aside a block of RAM to act as the D: drive. You get SPOOL, a program that will reserve up to 63K as a print buffer. And you get a barely adequate set of instructions to help you install the board and run the software.

In the unit I reviewed, the hardware did its job pretty well with no loose chips and no parity errors. But the rest of the package reflected its bargain-basement price.

Name of board
Apparat RAM Card

Manufacturer
Apparat, Inc.
4401 South Tamarac Parkway
Denver, CO 80237
(303) 741-1778

Price
\$149 with 64K RAM, SDRIVE RAMdisk software, and print buffer software; \$341 with 256K RAM

Cost of additional RAM
\$64 per 64K

Parity checking available?
Yes

Number of serial ports
None

Number of parallel ports
None

Battery backup?
No

Type of battery
Not applicable

Software compatible with DOS?
Yes, 1.1 and 2.x

Number of drives emulated
One

RAMdisk installable as DOS 2.0 device driver?
No

Can user select memory occupied by RAMdisk?
No

Minimum/maximum size of each RAMdisk "drive"
64K/320K

Print spooler provided?
Yes

Variable print spooler size?
Yes

Supplementary programs
None

REVIEWS

Bargain Basement Manual

The instruction manual for the RAM Card consists of 18 loose-leaf pages that fit easily into your *Guide to Operations* manual. How did the tech writers at Apparat manage to squeeze all of the necessary installation and operating information about the RAM Card into a mere 18 pages? They didn't. They left a lot out, leaving you to fill in the blanks.

Sometimes the Apparat manual does go into detail, but it's the kind of detail only a technical junkie could take an interest in.

For instance, they tell you that you must change the PC's system board switches to reflect the additional memory, but they don't tell you where the switch boxes are. If you're on the ball, you'll remember that the PC's *Guide to Operations* has a nice illustration showing the locations of switch boxes 1 and 2. But it would have been nice if Apparat had included a diagram in its own instructions.

Another irritating omission in the instruction manual for the Apparat card is the lack of any discussion of how to use the print buffer program. Happily, it works very much like the RAMdisk program, so that with a little bit of common sense, you can figure out what to do on

your own. Or you can call Apparat, where the folks are quite friendly and helpful, making you wonder how these people could have produced such a lousy instruction book.

Sometimes the manual does go into detail, but it's the kind of detail only a technical junkie could take an interest in. For example, in one place the manual provides you with a formula for calculating the starting address for "bank 0" on the RAM Card. I experienced a moment of panic when I read about this address calculation, since my hexadecimal arithmetic is a bit rusty. Then I turned the page to find that the discussion was simply irrelevant. I didn't need to know the starting address—only the memory size of the RAM Card.

Eventually, I did get the board installed, and it worked fine, except for a problem with my Pascal compiler. I found the Apparat software simple but adequate. The RAMdisk program (SDRIVE) sets up an electronic disk as the D: drive, which can vary in size from 64K to 320K. The print buffer program (SPOOL) can set aside up to 63K bytes as a print buffer for a parallel printer, although I couldn't get the program to work with a serial printer. There are no software controls for this print buffer; if you want to stop printing because the paper is jammed or you want to correct an error, you have to turn off the printer and reboot your system to clear the buffer.

In sum, you won't get a lot of bells and whistles with the Apparat RAM Card. But if you have the knowhow and you don't mind struggling a bit to install it, and if simple software will meet your present needs, it's an economical way to add more memory, a RAMdisk, and a print buffer to your PC.—Dara Pearlman

PERSYST SB 384 TIME SPECTRUM: RICH WITH FEATURES

Persyst's multifunction memory board, the SB 384 Time Spectrum, does everything it's supposed to do, and, for the most part, does it well. Its manual is well organized and full of helpful illustrations and examples. The hardware is easy to install and runs without a hitch. And the Persyst RAMdisk and print buffer programs are powerful, flexible, and easy to use.

The quality of this package becomes apparent when you begin to install the hardware. The SB 384 Time Spectrum manual leads you through the installation procedure step by step, with lots of illustrations. Even putting in the parallel and game ports is a snap because of Persyst's "cliffhanger" design. The ports, connected by a ribbon cable to the SB 384 Time Spectrum, slide onto the back of the chassis like elegant paper clips. You use a screw from an expansion-slot cover to secure each port, then slide the system unit cover back on over the cliffhanger ports.

One error in the manual can lead to some confusion. The manual tells you to make sure the yellow jumper plugs on the board were correctly positioned. I noticed my board did not match the diagram in the manual, but when I called Persyst, I learned that the mistake was in the diagram, not the board. This is a minor glitch in an otherwise trouble-free installation.

You install the hardware only once, but

you use the software every day, and here the Persyst SB 384 Time Spectrum really shines. The RAMdisk program, called Insta-Drive, lets you define up to four electronic disks ranging from 32K to 360K. Although the standard PC only recognizes four disk drives, Insta-Drive lets you get double use out of the disk drive names. So, if you create electronic drives with the same names as your real disk drives—say drives A: and B:—they will be a kind of ghostly presence alongside the real drives A: and B:. You use a toggle command to activate one of the electronic drives. Another toggle banishes the electronic disk back to the ether and activates the corresponding real disk drive.

Insta-Drive gives you a choice regarding the sizes of your RAMdisks. You can ask for the equivalent of a single- or double-sided disk drive, or specify the exact memory capacity you want. Insta-Drive can also help you determine the proper size for your RAMdisk. For instance, if you're running *WordStar*, which needs 64K of system memory, you can assign any remaining memory to a RAMdisk by telling Insta-Drive to reserve 64K of system memory. On command, Insta-Drive will also give a status report on the memory allocated to each RAMdisk.

Persyst's print buffer program, called Wait-less Printing (WP for short), gives you an internal print buffer with much of the power of a standalone print buffer. And unlike most standalone print buffers, WP works with both serial and parallel printers. WP can do relatively simple things such as clearing the buffer or suspending and restarting your printing. It can also perform fancy tricks, such as putting the print buffer on hold while you print something else, or reprinting a page.

WP has a few limitations. Since it can

create only one buffer at a time, if you use more than one printer, you'll have to reset the system before you can use a WP buffer with your second printer. The page reprint feature will only work if form-feed (ASCII 12) characters mark the end of each document page. So, if your word processor uses multiple line-feed commands (ASCII 10) to advance to a new page, WP won't be able to reprint your page. Also, there's no way to communicate with WP while you're using your word processor or other application program. Thus, to suspend printing or clear the buffer, you must return to DOS to issue the appropriate commands. But even with these limitations, Wait-less Printing is a powerful print buffer program.

The SB 384 Time Spectrum comes with serial and parallel ports and an optional game port. A clock/calendar with a rechargeable battery keeps track of the date and time if you include Persyst's clock program in your AUTOEXEC file. The clock keeps good time. There's even an extra for programmers; the manual includes a short assembly language routine to get the time directly from the clock rather than through DOS.

All in all, Persyst has packed a lot of value into the SB 384 Time Spectrum. If you're looking for a reliable multifunction board with multifunctioned RAMdisk and print buffer software, the Persyst SB 384 Time Spectrum is a good choice.

—Dara Pearlman

Name of board
SB 384 Time Spectrum

Manufacturer
Persyst Products
3545 Harbor
Costa Mesa, CA 92626
(714) 662-5600

Price
\$295 with zero RAM, one serial port, one parallel port, and RAMdisk and print buffer software; \$895 with 384K RAM; game port, \$50 additional

Cost of additional RAM
\$175 per 64K

Parity checking available?
Yes

Number of serial ports
One

Number of parallel ports
One

Battery backup?
Yes

Type of battery
Rechargeable nickel-cadmium

Software compatible with DOS
Yes, with 1.1 and 2.x

Number of drives emulated
Four

RAMdisk installable as DOS 2.0 device driver?
No

Can user select memory location occupied by RAMdisk?
No

Minimum/maximum size of each RAMdisk "drive"
DOS 1.1: 1K/320K; DOS 2.x: 1K/360K

Print spooler provided?
Yes

Variable print spooler size?
Yes

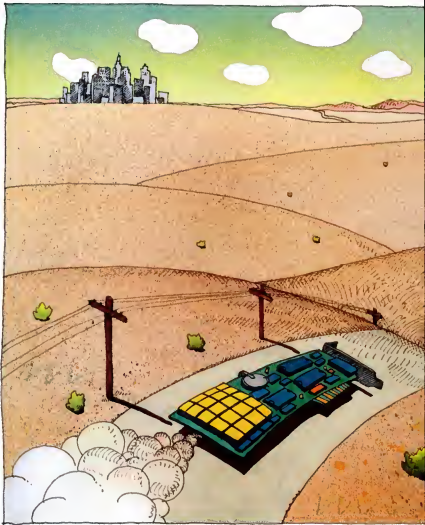
Supplementary programs
None

COVER STORY • DAN RUBIS

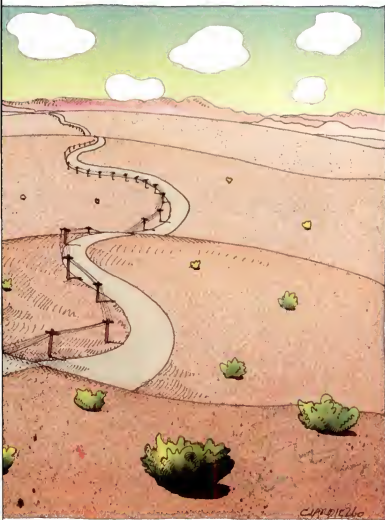


AN OUTSIDE FOR YOUR PC

MODEMS



LINE



Modems allow PCs to communicate over phone lines. Here's a shopping guide to seven of the most popular internal modems and some tips for using them.

Once you have decided to use your microcomputer to access other computers, you have a second decision to make: which modem you should buy for the job that you want done. First, you need to know some basic facts about using personal computers for communicating over telephone lines. I'll talk about these and review seven of the most popular internal modems for the PC.

What Is a Modem?

Standard telephone communication equipment can transfer only analog information over the telephone lines. It handles the human voice or any analog signal between 700 and 3,000 Hz nicely, but computer data are digital. Digital data, with discrete logic levels of zero and one,

MODEMS

are not compatible with telephone communication equipment. To send digital data over the telephone lines, the data must first be added to an analog signal (carrier) that is compatible with telephone transmission. This signal processing is called *modulation*. The complementary process, called *demodulation*, extracts digital data from the analog signal.

A modem (short for modulator/demodulator) is a device that can take digital information from a computer, transform it to analog information, and transmit it over telephone lines. A modem can also take an analog signal from the phone lines and transform it back into digital information that is compatible with the computer.

Modems have come quite a long way since the old days, when Teletype terminals clipped along at a "blazing" speed of 110 bits per second, producing so much noise they made an auto-body stamping plant sound like a library in comparison. Now, transmitting 1,200 bits per second is very common.

Not only have communication speeds increased, but modem prices have dropped quickly. Acoustic dumb modems that ran at 300 bps used to cost \$300. Now that the circuitry for 300-bps modems has shrunk down to a single chip, some barebones modems cost well under \$100. "Smart" 1,200-bps modems with convenience features such as auto-answer and

autodial now cost between \$400 and \$500. These 1,200-bps modems will drop into the \$100 to \$200 range when their added functions can be reduced to single chips.

The transmission rates available from such information services as CompuServe and Dow Jones News/Retrieval are relatively slow. While 1,200 bits per second may seem fast to some, it is not fast enough for transferring large blocks of data. A transmission speed of 4,800 bps is about the fastest possible on standard switched phone lines. The growing need for faster transmission rates, emerging communication electronic technology, and stiff competition among modem man-

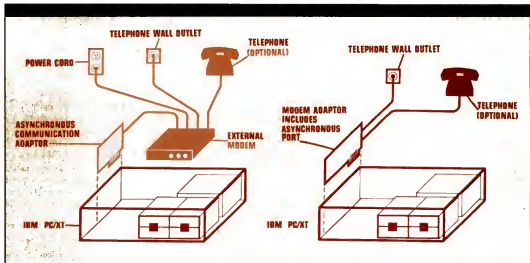


Figure 1: Typical installations for external and internal modems. Notice that the external modem needs an asynchronous adapter board and several cables, while the internal modem connects only to a telephone wall outlet and possibly a telephone. It draws its power from the computer.

Teleservice Telesupport

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- All returns must have authorization
- \$100.00 minimum order
- Products and prices subject to change
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HARDWARE & PERIPHERALS	RETAIL PRICE	MICRO FLASH
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AST Research		
SixPakPlus 64K	395.00	269.00
MegaPlus II 64K	395.00	269.00
ADVANTAGE! 128K for AT	495.00	379.00
54K Ram Chip Sets	100.00	50.00
Hauppauge Intel 8087 Chip	175.00	157.00
Hauppauge Intel 80287 Chip	295.00	275.00
Hayes Smartmodem 1200	699.00	489.00
Hayes Smartmodem 1200B	539.00	439.00
Heracles ColorCard	245.00	198.00
Heracles Graphics Card	499.00	359.00
10MEGA Bernoulli Box 20MB	3695.00	2995.00
Plastratics PC+ COLORPLUS (SYMPHONY COMPATIBLE)	560.00	389.00
Priesters—Epson, Okidata, Okiwaka		
NEC, JUKI & Others		\$CALLS
Priceloc Graphics		
MAX-12 Amber Monitor	249.00	189.00
HX-12 HI-RES RGB	695.00	524.00
SR-12 SUPER HI-RES RGB Monitor w/Scan Doubler	1048.00	843.00
PTI Outshield Back-up Power Supply — 200 Watt	359.00	325.00
Percept 80B Display Card	595.00	478.00
Texas 440 RGB w/Text Switch	899.95	759.00

SOFTWARE		
Ashita-Tale @baseit	\$ 895.00	\$ 389.00
FRAMEWORK	695.00	389.00
BPI Systems Accounting on FUNK Software SIDEWAYS	595.00	398.00
Harvard Project Manager	60.00	48.00
Hemaa Edge Mind Prober	395.00	275.00
Lifeboat Lattice C Compiler	49.95	39.00
Living Videotext Think Teek	500.00	364.00
Microsoft	145.00	110.00

Multiplus™	195.00	139.00
Word & Spell	375.00	249.00
Word & Spell w/Mouse	475.00	298.00
Basic Compiler	395.00	276.00
C Compiler	500.00	349.00
Fortran Compiler	350.00	244.00
Cobol Compiler	700.00	518.00
Macro Assembler	100.00	74.00
Project	250.00	188.00
Chart	250.00	198.00
Morgan Computing Track 86	125.00	99.00
Professional Basic	345.00	299.00
MultiMate Word Processor	495.00	278.00
Quarterdeck QED	496.00	376.00

PRODUCTS FOR APPLE MACINTOSH		
Hebe Systems Hodedex	\$ 200.00	\$ 159.00
Haman Edge Mind Prober	49.95	36.00
Microsoft		
Multiplus™	195.00	139.00
Basic Interpreter	150.00	122.00
Chart	125.00	99.00
Word	195.00	148.00
PF5 File & Report Package	195.00	148.00
Stoneware GB Master	138.00	108.00
Teles Filevision	195.00	148.00
Tecmar 5 MB Removable	2295.00	1695.00

Many other
products available
at comparable
discounts!
Quantity
pricing available

For product
information,
price quotes,
technical support
and California
orders,
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To order from
outside California,
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ufacturers should combine to produce 4,800-bps modems for personal computers soon.

Another recent advance has been board-level modems for the PC that plug into an available expansion slot on the main system board. They have several advantages over external, or stack, modems. (See Figure 1). An internal modem has its own asynchronous communication circuitry wired onto the board (a \$100 savings); it plugs directly into an expansion slot and draws its power from the host computer, thereby eliminating the need for its own power supply. The only thing it needs outside the computer is the telephone line. The unsightly and cumbersome cables of an external modem are eliminated. These advantages may seem small if you have just started to add peripherals to your computer, but if you have a lot already, you will no doubt appreciate the elimination of even one extra cable or box.

Modem boards do have some disadvantages. They take up one expansion slot in your computer. They draw a significant amount of power from your computer and produce heat that your computer's ventilation system must dissipate. Most boards require a ½ ampere of current, which is about the same amount as one 256K memory board.

Evaluation of Modems

I have reviewed here seven of the eight board-level modems on the market at the time of this writing: Hayes Microcomputer Products's Smartmodem 1200B, Rix-on's PC212A, Ven-Tel's PC Modem/1200, Bizcomp's PC-IntelliModem, IDEAssociates' IDEComm 1200, Qubie Distributing's Qubie PC Modem, and Novation's Smart-Cat Plus. US Robot-

ics's Telpak arrived too late, and other entries in this growing market have been announced but are not yet available.

All are 300/1,200 bps, auto-answer, auto-dial modems that meet Bell System

I tested each modem to verify that it performed as advertised. Every one passed on the first try.

Standard 212A and include a telephone extension cable and a circuit board support guide.

I tested each of the modems to verify that it would perform as advertised by transmitting a 10,000-character ASCII file to a remote computer that was three telephone switching stations away, by verifying that the uploaded file was correct, and by receiving and verifying the same file from the remote computer. Every one of the seven modems passed the test on the first try.

I didn't do any laboratory testing that would have compensated for line noise. If you have especially noisy phone lines in your area, ask your modem dealer for a try-out period, and test the modem using the suspect phone lines. Most telephone lines in the United States should present no problems.

All seven modems include telephone interfaces certified by the FCC. Although this certification only guarantees that the circuitry protects the telephone network from damage or interference from the modem, it indirectly ensures high-quality circuit design. As part of this certification,

the modem is subjected to vibration, temperature, and humidity extremes, a drop shock test, and extreme overvoltages before it is performance-tested to meet the FCC standard.

All the modem boards came with a communications program. Some modem manufacturers wrote their own communications software, and some included such generally available software as *PC-TALK III* or *CROSSTALK XVI*. Most of the communication software written by the modem manufacturers themselves is inferior to software from independent developers.

When I examined each modem, I organized my work around ten categories: the shipping package, the user manual, the electronic circuitry, the mechanical features, ease of installation, communication programs, warranty and service, company stability, price and special features, and general comments. In some of these categories, I found little difference among the eight modems.

● **Shipping package.** The packaging a modem is shipped in can be important, since most modems are sold by mail order. If the board is damaged during shipment and must be returned to the manufacturer, it could be months before you receive a working one. All the modems came in elaborate protective packaging, many in anti-static plastic bags. Only one modem, the Qubie PC Modem, was damaged during shipment—its rear mounting bracket was bent but was easily repaired. The foam packaging of another modem, the Novation, Inc., Smart-Cat Plus, was broken during shipping. Luckily, the modem itself was intact.

● **Mechanical features.** All the boards are full length, .75 or .76 inches thick, and will fit into any slot in the PC or the

MODEMS

crowded XT without interfering with adjacent boards.

● **Installation.** With all the modems, except the Hayes Smartmodem 1200B, I found installation somewhat tricky. The telephone jack of the Hayes board is the only one that protrudes into the rear opening of the PC. Since the others are flush, alignment may be difficult, and you may find that once you have seated the board and replaced the PC's cover, you can't plug in the telephone. The best way to

ensure that the modem board is aligned correctly is to plug a telephone into one of the board's jacks after plugging the board into the expansion slot. Align the modem board in the PC to ensure easy insertion and removal of the telephone plugs and then tighten the bracket installation screw.

In the other categories, I found both small and significant differences between the various modems. The table "Modem Operandi" compares the most salient features.

IOEACOMM 1200

● **User manual.** IDE Associates (IDEA) has packaged its user and installation manual in a single volume with high-quality printing and 97 pages of easy-to-read and well-organized material. The manual is printed on three-hole looseleaf pages that will fit into an IBM-style binder. No binder was supplied with the modem package. The publisher made liberal use of bold typefaces and well-done line art.

MODEM OPERANDI

	Price	Software Included	Software Compatible					Mechanical	Hayes Command Compatible ⁽¹⁾
			Smartcom II	PC-TALK III	Relay	CROSS-TALK XVI	PC-XT Compatible		
Hayes Microcomputer Products Smartmodem 1200B	\$599	Smartcom II	•	•	•	•	•	3/4" thick	•
IDE Associates, Inc. IOEAcComm 1200 (Wolfdata)	\$545	IOEAcComm	•	•		•	•	3/4" thick	•
Gubish Distributing, Inc. Gubish PC 212A/1200 (Wolfdata)	\$299	PC-Talk III ⁽³⁾	•	•		•	•	3/4" thick	•
Sizcomp, Inc. PC-IntelliModem	\$499	PC-IntelliModem		•		•	•	3/4" thick	
Rioxon, Inc. Rioxon PC212A	\$499 \$539 ⁽⁵⁾	Rioxon PC Com I		•	•	•	•	3/4" thick	• plus Rioxon
Von-Tel, Inc. PC Modem/1200	\$499 \$549 ⁽⁵⁾	CROSS-TALK XVI		•	•	•	•	3/4" thick	•
Novation, Inc. Smart-Cat Plus	\$499	Mite	•	•	•	•	•	3/4" thick	•

(1) Modems that include essential Hayes commands. (2) Also includes 30-day satisfaction guarantee. (3) Included with modem at \$299 but you should send \$35 to Headland Press. (4) Includes extra jack for telephone handset allowing easy switching between data mode and voice mode. (5) Includes extra communications port for serial printer. (6) Typical availability in large cities.

One significant omission in the otherwise complete manual was information about the modem's RS-232 port. The manual doesn't tell you whether the port truly conforms to the full RS-232 standard. It does not even supply a connector pinout designation diagram, which could help if you were trying to connect a serial printer or other peripheral to the port.

• **Electronic circuitry.** The modem circuit board is a double-sided, full-length board with connectors (RJ11C) for the telephone

set and line cables and an additional 25-pin D-connector for controlling other peripherals through the asynchronous port. The 25-pin connector that IDEA describes as an RS-232 serial port may or may not be the full implementation of the EIA standard RS-232. I tested the async port with a Leading Edge Starwriter letter-quality serial printer, and it worked like an IBM-type serial port.

Remember that this RS-232 port is the modem port. You can't send data through

the port to a printer while using the modem. So, if you plan to use a serial printer with your computer system, you will need a separate serial port.

The circuit board can be configured for either COM1 or COM2 communications ports by swapping two jumpers. It is important to make this connection if you already have an asynchronous port on a multifunction board configured as COM1. If two asynchronous ports are configured to the same logical designation, neither will work.

Other points of interest on the IDEA board are its wafer speaker for monitoring the telephone line while connecting to the remote computer. You can adjust the speaker volume, but the volume control is not externally accessible from the rear bracket.

A DIP switch allows you to set nine different default configurations, a convenience if you are not using IDEA's software and have to change the configuration for the foreign software.

Schematic drawings of the circuits were not included with the documentation, but it appears that IDEA is using General Instrument integrated circuits (ICs) for modulation and demodulation, a Reticon IC for filtering, a Western Digital 8250 async port IC for communicating with the PC, and a Zilog Z-80 microprocessor for controlling the modem functions.

• **Installation.** IDEA gives you good installation instructions, one of the few manufacturers that does.

The board has two telephone jacks on its rear bracket for connecting the telephone set and the telephone line. Neither jack is labeled and neither is the RS-232 D connector. Although IDEA's installation instructions say that the telephone cables

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•		•	1 year factory ⁽²⁾	Mail order only		
•	• plus Voice ⁽⁴⁾		1 year factory	Calif.		
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• ⁽⁴⁾			1 year factory	Calif.		
•	•	•	2 year factory	Local	•	•

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major advantage is price: it costs only \$299, at least \$200 less than any other modem of its type.

• **Comments.** For the hobbyist, the Qubie is the best buy on the market. If you don't need many frills or local dealer service and do not mind dealing through mail order, this would probably be your modem of choice.

PC MODEM/1200

• **User manual.** Ven-Tel's installation and user manual is a single volume with 275 pages. It comes with an IBM-type three-ring binder and case. The user manual portion results from a joint effort between Ven-Tel and Microstuf, publisher of *CROSSTALK XVI*, which is included with the board. The user manual is well organized and makes liberal use of boldface. It is one of the best of the modem manuals I saw. Unfortunately, the installation portion of the manual is not up to this standard. It used unclear photographs to illustrate the installation procedure. Line drawings would have been more helpful.

• **Electronic circuitry.** The PC Modem/1200 uses a full-length, single-board design. Custom integrated circuits make this board look uncrowded and efficient.

The Ven-Tel PC Modem/1200 board is easily configurable to almost any communication need. You can set the modem for either COM1 or COM2 by changing a jumper. Also, you can set a DIP switch to make auto-answer and carrier-detect default conditions, a nice convenience when you are not using *CROSSTALK XVI* and have to change the modem configuration for foreign software.

On the modem board is a miniature speaker that lets you monitor the telephone line while the computer is making its con-

nection. This is a desirable feature because it lets you hear that the connection was successful. However, the Ven-Tel design has problems. As you turn on the computer, a loud screech comes from the speaker. Also the board allows a hissing feedback from the modem circuits to come out of the speaker while you are connected, and you can't vary the volume of the speaker.

• **Mechanical Features.** The mounting bracket hole on the Ven-Tel did not line up well with the hole in the computer. I had to bend the bracket into position before I could start the screw.

Ven-Tel has discontinued the PC Modem Plus, another model with an extra

The Ven-Tel PC Modem/1200 can easily be configured to meet most communications needs.

asynchronous port, but it added a new modem board to its offerings called the PC Modem Half Card. It is half of the length of the PC Modem/1200 and fits nicely into one of the XT's short expansion slots. The Half Card lacks some of the nice features of the full-length board, such as the on-board speaker and a second telephone jack on the mounting bracket but Ven-Tel says newer models will have them.

• **Installation.** The PC Modem/1200's mounting bracket contains two telephone jacks, one for the telephone line and the other for attaching a telephone set at your option. These jacks are unlabeled. Al-

though Ven-Tel's installation instructions say that the telephone cables can be plugged into either jack, it would reassure users if the jacks were labeled.

• **Communication program.** Ven-Tel includes the *CROSSTALK XVI* communication program, one of the most advanced communication programs available for microcomputers. Its power does, however make *CROSSTALK XVI* harder to use—the user manual is over 200 pages long. If you need a program that has almost every imaginable feature, the time you invest learning *CROSSTALK XVI* will be well spent. A couple of hours worth of reading and experimenting should be enough to get you started.

• **Warranty and service.** Ven-Tel offers a 1-year limited warranty and advises you to send in the warranty card immediately. Other than that direction, the documentation gives no other information on how to get service for your modem. In fact, the disclaimer information section of the manual was longer than the warranty section. It includes no factory service address or dealership service instructions. Furthermore, although the PC Modem Plus came with a 2-year warranty, the PC Modem/1200 documentation says the 1200 has only a 1-year warranty. When I called Ven-Tel, I was assured that the company includes a 2-year warranty with all its internal modems for the PC and XT. But to be on the safe side, if you get a modem with documentation that says you have only a 1-year warranty, write a letter to the company clarifying the warranty length as 2 years.

• **Company stability.** Ven-Tel, a privately owned company, has for 9 years produced modems for other companies and communication systems for large companies. It has only recently begun producing mod-

MODEMS

ems for the individual consumer.

- **Price and special features.** Ven-Tel's PC Modem/1200, which goes for \$499, is compatible with such popular communication programs as *PC-TALK III* and *Relay*. The PC Modem Half Card retails for \$549.

- **Comments.** The Ven-Tel modem board will be popular because of its compatibility with Hayes commands, its on-board speaker, and most importantly, the inclusion of *CROSSTALK XVI* as part of the package.

PC212A MODEM

- **User manual.** Rixon, Inc.'s PC212A installation/operation and communication program manuals, in the IBM three-hole format, came with a not-very-useful plastic booklet instead of the customary three-ring binder.

The 68-page manual for the Rixon *PC Com I* program is not professionally typeset and is hard to read. In contrast, the 76-page installation manual is typeset and makes good use of boldface and italics. Unfortunately, my review copy of the installation manual contained several errors that made reviewing the modem board difficult. (Rixon has since corrected the errors). Both manuals had an adequate table of contents but neither had an index. Compared with manuals for competitive boards, they fall short of the mark.

- **Electronic circuitry.** The Rixon modem comes with two RS-232 ports, one of which you can use to control other serial peripherals. The board's layout is good, in fact less cluttered than others which have only a single port. And its many custom integrated circuits make the Rixon PC212A electronically the best designed of the bunch. I used a letter quality serial

printer to test the asynchronous port, which worked much like an IBM-type serial port.

The PC212A supports both the Hayes command set and Rixon's own set. It is a simple matter to switch between the two.

The modem board I reviewed could not be used with a multifunction board whose own port can't be disabled, a serious design oversight on Rixon's part. Newer models come with more flexible ports that you can configure for either COM1 or COM2 device addresses or disable them altogether by swapping jumpers. A model

Its many custom
integrated circuits
make the Rixon
PC212A
electronically the
best designed of the
bunch.

with only one port is also available for those who do not need the extra serial port.

The Rixon board does not have configuration DIP switches like some other modems. You can set such communication options as carrier detection and auto-answer under software control. One option Rixon left out is the sensing of data terminal ready status. Some third-party software checks for data terminal ready, and so the board should be able to ignore the logic state, if desired. Despite this fact, I had no problems using popular communication programs with the modem.

- **Installation.** The Rixon has two telephone jacks on the rear bracket for connecting the telephone set and the telephone line. Neither the jacks nor the RS-232 D connector are labeled as such. The installation manual does cover installation of the telephone plugs (the telephone line goes in the lower jack), but if you should happen to move your computer, you may not have the installation manual along.

- **Communication program.** Rixon includes *PC Com I*, its own menu-driven, entry-level communication program. The company actually supplies two programs, one written in interpreted BASIC that fits in 64K of RAM and a compiled BASIC version that needs 128K to run. Both are well-done programs that provide for your basic needs.

- **Warranty and service.** Rixon offers a 2-year limited warranty, but if something does go wrong, you must pay \$25 for return freight, insurance, and handling when you send it back for repair.

- **Company stability.** Rixon is owned by Schlumberger, a large, multinational company whose main business is precision electronic sensing equipment and services for oil companies. It is safe to say that Rixon has strong financial backing. Rixon itself claims to have manufactured data communication equipment for more than 2 decades.

- **Price.** The dual-port modem costs \$539, and the single-port model is \$499.

- **Comments.** The Rixon PC212A modem is electronically very powerful. It allows you to use either the Hayes or Rixon command set, has two serial ports, and can remember up to ten 60-character telephone numbers. Also, Rixon's PC212A Modem is compatible with such popular communication programs as *PC-TALK III*, *CROSSTALK XVI*, and *Relay*.

PC:INTELLIMODEM

● *User manual.* Bizcomp's PC:IntelliModem reference manual is a 52-page volume with instructions for installing the modem and running the Bizcomp communication program, *PC:IntelliCom*. The pages are supplied without a binder and are three-hole-punched like those of the IBM manuals.

My review copy said the manual is only a preliminary version. A postcard was included for requesting the "real" manual when it becomes available. I felt lucky that this manual was only 52 pages long because it was a real chore to read it. It was produced on a dot matrix printer—and not one of the better printers.

The only good thing about the Bizcomp documentation is the nicely done line art in the installation instructions. Otherwise, most essential information is missing: an index, a glossary of modem terms, a section showing the modem commands, a schematic diagram of the circuitry, and a good description of the installation procedure.

● *Electronic circuitry.* The PC:IntelliModem board includes many advanced communication features that cannot be found on any other board, such as key-board-switchable voice communication and electronic sensing of the telephone line status. It will detect a dial tone, ringing, a busy signal, a dead line, and it will even electronically detect a voice at the other end so you can switch to the voice mode and use the handset to talk with the person. This electronic voice-sensing feature is truly amazing. With Bizcomp's modem, you don't need a telephone for voice communication, only a handset.

You can easily configure the Bizcomp PC:IntelliModem board for either COM1

or COM2 by changing a jumper. You handle all other configurations, such as Data Terminal Ready or Data Carrier Detect with software commands. The Bizcomp has no DIP switches.

For those who want to listen while the computer connection is being made, an on-board miniature speaker is included. This feature is essential for those who use other software that does not support the modem's voice or busy-signal detection feature. I did get some feedback noise through the on-board speaker when I used the telephone for voice communication. Bizcomp told me that a minor change to

PC:IntelliCom is Bizcomp's own. No commercial program supports Bizcomp's advance telephone line monitoring features.

the *PC:IntelliCom* program would remedy this problem.

● *Mechanical features.* The PC:IntelliModem has three telephone jacks on the rear bracket for connecting the optional telephone handset for voice communication, the telephone set, and the telephone line. The jacks are not labeled, an important oversight since you must plug each line into the correct jack. You have to refer to the manual each time you plug them in.

● *Communication program.* The *PC:IntelliCom* program is Bizcomp's own. No commercially available program supports

Bizcomp's advance telephone line monitoring features. However, *PC:IntelliCom* lacks many other important abilities of commercial communication programs. Another problem with *PC:IntelliCom* is that it has so many levels of menus, it's easy to get lost. Until Bizcomp improves its program, you might want to use something like *PC-TALK III*, although you will sacrifice the line monitoring and voice communication features.

One important feature left out of the Bizcomp program is a "filter" for unwanted characters. A mainframe computer sometimes sends out extra nonsense characters needed for old teletype terminals, which do not have a character buffer and need a slight delay while the printhead travels back to the beginning of the next line. Luckily, *PC:IntelliCom* is written in interpreted BASIC, so it can be listed and modified.

● *Warranty and service.* Bizcomp offers a 2-year limited warranty and advises you to send in the warranty card immediately. "We will repair or replace product which proves to be defective during the warranty period, provided the defective unit is returned to Bizcomp in good condition showing normal use," says the manual. Other than that, the documentation gives no information on how to get service for your modem, such as a factory service address or dealership service instructions.

● *Company stability.* If you look only on the surface, you might say Bizcomp is a risky bet, because it is a privately owned company founded only a few years ago by Michael Eaton. However, Bizcomp has recently been granted a U.S. patent for the design of intelligent modems. It is possible that all "intelligent modems" produced by other manufacturers may be

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MODEMS

infringing on Bizcomp's patent. It is rumored that Hayes Microcomputer Products has already signed a multimillion-dollar agreement with Bizcomp.

With this patent, Bizcomp is in a very strong financial position and should be in business for a long time.

- **Price and special features.** Bizcomp's PC: IntelliModem, at \$499, is compatible with such popular communication programs as *PC-TALK III* and *CROSSTALK XVI*. Its voice communications and line monitoring features are unique.

- **Comments.** The PC: IntelliModem's documentation needs significant improvement in both content and presentation, and its communication program needs several basic features added. These items are easily fixed, and when done, this modem will prove to be one of the most advanced on the PC market.

SMARTMODEM 1200B

- **User manual.** The Hayes Microcomputer Products hardware reference manual for its Smartmodem 1200B is an 82-page single volume covering installation of the modem and the Hayes registers and modem-control commands. The pages are spiral-bound and made of good-quality, heavyweight paper. Liberal use of bold-face, figures, and tables make this well-organized manual easy to understand. Also, the manual includes a handy *Quick Reference Card* for the Smartmodem commands and register assignments.

Hayes used photographs to illustrate the installation of the modem into a PC, but line art would have been a better choice.

The Smartmodem comes with Hayes's own *Smartcom II* communication software. Its manual uses the same quality

paper and typesetting as the hardware manual but in an IBM-type three-ring binder and case. The *Smartcom II* manual is well organized into nine chapters that give clear instructions on every detail of

New Hayes modem products can no longer be considered the leading edge of technology.

the program. It has a table of contents for each of the chapters, which are also separated by tabs. It includes an index at the end. The Hayes manual is the best one I saw.

- **Electronic circuitry.** The Smartmodem 1200B is a full-length single-circuit board with one asynchronous port only for the modem's use. It has an on-board speaker for monitoring the communication connection to the remote computer. The sound quality is far better than that of other modems with on-board audio monitoring devices because the speaker is as large as the speakers in most hand-held radios.

The first version of the Smartmodem 1200 board had a speaker volume control on the rear bracket, but the latest design does not. It is unfortunate that Hayes decided to remove the control, because in a quiet office the speaker is too loud.

It is possible to change the volume of an on-board speaker with software and eliminate the need for a volume control, but no manufacturer has yet made such provisions.

The Hayes Smartmodem 1200B is eas-

ily configurable for either COM1 or COM2 with a DIP switch. By changing a jumper, you can set the Data Terminal Ready signal to be on all the time. You can program all other configurations.

The design of the Hayes Smartmodem 1200B is not innovative or special—it is the same circuit that is in the free-standing Smartmodem. New Hayes modem products can no longer be considered the leading edge of technology—they do not signal dial tone detected, ringing, busy, dead line, and voice detected conditions, nor do they have any daring new advanced capabilities. Why, then, is Hayes the market leader in 1,200-bps modems? Because although Hayes, like IBM, is not on the leading edge of technology, it offers quality products and good service.

- **Mechanical features.** The Hayes Smartmodem 1200B board has two telephone jacks on the rear bracket for connecting the telephone set and the telephone line. The jacks are labeled—a feature most of the other companies left out.

- **Installation.** The Smartmodem's jacks protrude a bit into the connector openings in the PC, making it easier to line up the jacks with the hole.

- **Communication program.** Hayes's *Smartcom II*, Version 2, can be considered one of the best full-featured communication programs available for microcomputers. It is a menu-driven program, which makes it slightly easier to use than a command-driven program like *CROSSTALK XVI*, because you do not have to memorize commands or parameters—you pick them from menus.

- **Warranty and service.** Hayes offers a 2-year limited warranty and requests that you send in the purchase registration card. The documentation gives you complete instructions for returning the unit for

repair. Hayes also has a customer service department that you can call for assistance.

- *Company stability.* Undoubtedly, Hayes will be in business for a long time. It has over 50 percent of the 1,200-bps modem business and is moving into the software business with a database program called *PLEASE*.

- *Price and special features.* The *Smartcom II* program is included in the modem's \$599 price. The program would otherwise cost \$149. You cannot buy the Smartmodem 1200B without the *Smartcom II* software. The price is a little hard to swallow considering that one of Hayes' competitors sells a similar board without software for \$299. This pricing is an unfortunate mistake on the company's part: it is losing customers who want to use the inexpensive *PC-TALK III* or some other competing software. (Granted, Hayes is not the only company that includes a program whether you want it or not.)

- *Comments.* Hayes Microcomputer Products has set a standard with not only the ad hoc Hayes command set, but with the quality of its products and its support.

SMART-CAT PLUS

- *User manual.* The Novation, Inc., *Smart-Cat Plus* came with an installation/operations manual and the Novation *Mite* communication program disk and manual. Novation's two manuals are packed together in a three-ring binder.

The chapter called "Installing Your Internal Smart-Cat Plus" is the best description of installation I came upon in any of the manuals I reviewed. The Smart-Cat uses the internal speaker of the IBM for audio monitoring. The Novation man-

ual clearly describes every step of the complicated hook-up procedure for the IBM's speaker and includes several line drawings.

The majority of the manual's opera-

The Novation Smart-Cat Plus permits you to use the PC's internal speaker to monitor line status.

tions section is devoted to an explanation of the Hayes command set. A removable pocket guide to the command set is also included, which is handy if you are using the modem commands directly. Additionally, the *Mite* program will also control the modem for you.

The *Mite* manual is professionally typeset and makes good use of boldface. It includes a helpful introduction to modem communications.

Both sections have adequate tables of contents, but neither has an index. In the operations section, Novation includes a glossary of terms at the beginning of each chapter.

- *Electronic circuitry.* The Novation Smart-Cat Plus is one of the more advanced modems on the market. It senses no tone, busy, and ringing line conditions. In addition, the modem also permits you to use the IBM PC's internal speaker to monitor line status.

The Smart-Cat Plus supports the Hayes command set and can be configured for either COM1 or COM2 device addresses by swapping two jumpers.

One annoying feature is that when you turn on the computer, the modem takes the telephone line "off the hook." If someone is on the same telephone line talking when you power up your computer, a loud click and tones can be heard coming from the modem's power-on test.

Novation is the only company that supplied schematic diagrams of the modem circuit; unfortunately, they are for the free-standing modem and not the internal Smart-Cat Plus.

The Novation board does not have configuration DIP switches, as do some of the other modems. Such communication options as carrier detection and auto-answer can be set with software.

The Smart-Cat is compatible with the four most popular communication programs.

- *Mechanical features.* The Novation board has volume control on the rear retaining bracket along with the telephone line and telephone set connectors, which are clearly labeled "to jack" and "to phone."

- *Communication program.* Novation includes the *Mite* communication program by Mycroft Labs. It is a powerful, menu-driven program but not quite as versatile as Hayes's *SmartCom II* or Microstuf's *CROSSTALK XVI*. It does include all of the standard file transfer functions, and is easy to use. For those who do not want all of the bells and whistles of the other top communication programs, this is the one for you.

- *Warranty and service.* Novation offers a 2-year limited warranty and operates a service center in California that can be reached by a toll-free number. You must call Novation to obtain a "return materials authorization number" before returning the modem to them for repairs.

MODEMS

• **Company stability.** Novation is a new company that produces good hardware and offers software from professional third-party programmers. Its marketing effort is strong.

• **Price and special features.** Novation charges \$499 for the Smart-Cat Plus with the *Mile* communication program, a good package price. The Smart-Cat Plus is chock full of special features such as

advanced telephone line status sensing, audio monitoring, external speaker volume control, a toll-free number for questions, and access to a 24-hour computer in California.

• **Comments.** The Novation Smart-Cat Plus modem is very capable. Except for a few minor flaws, this modem package with its extra features is one of the best available.

A Few Remarks

Setting up a modem for communication over telephone lines is not that easy. In fact, it would be best left to a qualified dealer if you are not familiar with the electronics of computers.

All the modems I reviewed had jumpers or DIP switches for configuring your modem to a variety of operating situations.

Remember, however, that once you set the jumpers and switches, you must open the computer again for changes. It is really not necessary to have all those jumpers and switches. The functions they perform can be replaced by programmable electronic switches that would give you complete control over the installation parameters right from the keyboard. Even the volume control can be controlled by software.

Another important point that none of the manufacturers addressed was a hardware reset button on the external mounting bracket. All these modems are controlled by their own on-board microprocessors. You might say the modems are miniature computers dedicated to communication functions. At times this computer can lock up and cease functioning, especially when you access the modem command set directly. Without too much effort, I was able to make every modem lock up. Only by turning off the computer could I reset them, thereby wiping out programs stored in the host computer's memory.

A small survey of dealers in this area showed that only a few of the most popular modems are available locally. Mail-order houses are the only way you can buy the others, even in large cities. This result means the majority of these companies are not doing a good job marketing their products.

PC

PC Modem/1200

Ven-Tel, Inc.
2342 Walsh Ave.
Santa Clara, CA 95051
(408) 727-5721
List Price: \$499

CIRCLE 791 ON READER SERVICE CARD

IDEAcomm 1200

IDE Associates, Inc.
7 Oakpark Drive
Bedford, MA 01730
(617) 663-6878
List Price: \$545

CIRCLE 792 ON READER SERVICE CARD

Qubiè PC Modem 212A/1200

Qubiè Distributing, Inc.
4809 Calle Alto
Camarillo, CA 93010
(800) 821-4479
List Price: \$299

CIRCLE 793 ON READER SERVICE CARD

PC212A

Rixon, Inc.
2120 Industrial Pkwy.
Silver Spring, MD 20904
(301) 622-2121
List Price: \$539

CIRCLE 794 ON READER SERVICE CARD

Smart-Cat Plus

Novation, Inc.
20409 Prairie Street
Chatsworth, CA 91311
(800) 423-5419
List Price: \$499

CIRCLE 795 ON READER SERVICE CARD

PC: IntelliModem

Bizcomp, Inc.
532 Weddell Drive
Sunnyvale, CA 94089
(408) 745-1616
List Price: \$499

CIRCLE 796 ON READER SERVICE CARD

Smartmodem 1200B

Hayes Microcomputer Products
5923 Peachtree Industrial Blvd.
Norcross, GA 30092
(404) 441-1617
List Price: \$599

CIRCLE 797 ON READER SERVICE CARD

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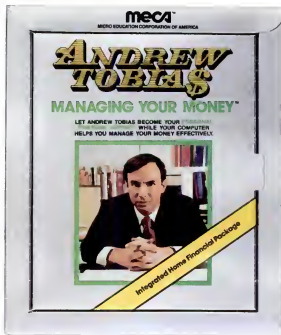
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fully-integrated
financial program
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"MANAGING
YOUR MONEY
is the most
complete home
finance package
I've seen. It's
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most easy-to-use
software
package I've ever
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KEN USTON'S ILLUSTRATED
GUIDE TO THE IBM PC



Disk version for IBMPC, XT, Compat and now for PCjr with 256K. Cartridge version available for PCjr at IBM authorized dealers.

Andrew Tobias'
new program
"can explain the
most complex
personal finan-
cial dilemmas
with impressive
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frequent twists
of wit."

FORBES,
APRIL 9, 1984

"You'd expect
MANAGING
YOUR MONEY
to be difficult
to use and full
of financial
jargon. It isn't."

COMPUTE'S PC & PCjr.
MAY 1984

The only financial software you'll ever need. The easiest financial software you'll ever use. It's seven programs in one. It prepares your budget and balances your checkbook. It calculates your net worth. It helps manage your stock portfolio. It calculates your taxes. It estimates your life insurance needs. It analyzes loans and helps you do retirement planning. It reminds you of important dates. No need for a big, bulky manual. With MANAGING YOUR MONEY™ all the help you need is constantly on-line, on the computer. And everything is integrated so you only need to enter data once.

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You can. It's called DunsPlus and it's built to respond to your information-related business demands without creating demands of its own.

DunsPlus gives the IBM PC XT a built-in business environment. This lets you mold DunsPlus to fit the way you do business.

Within the DunsPlus environment is a software base of the best. Lotus, MultiMate, Western Union electronic mail (to name but a few), are all ready for immediate use. But additional programs to solve your unique problems can also be added with ease.

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Installation is not an issue: DunsPlus is installed by IBM.

End-user training is not an issue: Training and support are part and parcel of DunsPlus.

Flexibility is not an issue: Any part of the DunsPlus solution—hardware, software, or service—can be tailored to meet your precise business needs.

In fact, there are no issues. DunsPlus does what you want, the way you want it—now.

Designing systems that reflect the way you do business is business as usual for us. NOMAD2, the premier 4th-Generation-Language/DBMS from D&B-Com-puting Services, has made us a leader in the field of information management services. And as your needs evolve, so do we. DunsPlus is just the latest step in translating technological advances into usable business tools—tools that reflect the way you do business.

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CHALLENGING THE PC AT

PCTURBO

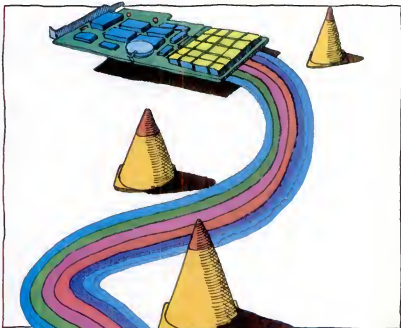


Illustration: Joe Castaldi Photograph: Les Merrill

Installing a PCTurbo-186 expansion board won't turn your PC into an AT, but it will add a full 16-bit processor and more than double its thinking speed.

PC TURBO

Attention PC and PC-XT owners: if you're thinking about taking in a demonstration of the new PC AT, don't. If you do, you'll soon be trying to sell the car, mortgage the house, and rent out the kids to raise enough cash for IBM's speediest PC. Your passions may even rankle your bookkeeper as much as your family because, more likely than not, you haven't yet worn out—let alone fully depreciated—the computer you already own.

If you long for AT performance but don't want to chuck your investment in your PC, your prayers have been answered—almost. Now you can boost the performance of your ordinary PC or PC-XT merely by plugging in Orchid Technology's PCTurbo-186 expansion card.

Granted, it's no ordinary expansion card. One of a new breed of high-performance add-ins, the PCTurbo-186 has the near-equivalent of an AT system board squeezed onto it.

The biggest difference between the PCTurbo-186 and the AT is the microprocessor. The AT uses an 80286 brain, while the Orchid uses an 80186. There are sig-

nificant differences between the processors, but they share an important similarity: both are full 16-bit units. That feature alone gives either one a big edge over the 8-bit data bus 8088 microprocessor in an ordinary PC or XT. Plugging in the PCTurbo-186 gives you full 16-bit performance in your PC.

The PCTurbo-186 is an entire comput-

The PCTurbo-186 is no ordinary expansion card. It has the near-equivalent of an AT system board squeezed onto it.

er. The single expansion board can hold 256K of memory (128K is standard). You can increase its capacity up to 640K with an optional add-on "daughterboard" that snaps on without taking up an additional expansion slot. Like the 80186 microprocessor, the RAM on both the PCTurbo-186 and the daughterboard uses a 16-bit-wide data path, double that of a non-AT IBM machine. That will help the PCTurbo-186 shuffle information around twice as fast as a PC can (disregarding other variables).

Any RAM chips already stuffed into your PC to boost its performance are not used by programs running in the PCTurbo-186. However, rather than letting all that high-priced silicon go to waste, utility programs included with the PCTurbo-186 let you put that memory to work as a disk cache (a holding area for data on disks that can tremendously speed disk access) or a print spooler.

Although the PCTurbo-186 board lacks a few of the essentials of a complete personal computer—such as a means of handling a video display and disk drives as well as the expansion slots to plug such things into—all the necessities are at hand. The PCTurbo-186 takes over the display board and disks (and controllers) of the host PC. In fact, it takes over everything. The PCTurbo-186 becomes a dictator over the data bus and orders your PC's innate 8088 microprocessor to handle all input/output operations. (There's nothing unusual about structuring a system in this manner; big mainframes such as the Cray 1 often make smaller mainframes do their housekeeping.)

The Once Over

The PCTurbo-186 is a sophisticated product, jam-packed with goodies. One-third of the full-length, multilayer expansion card houses four banks of nine 64K dynamic random access memory (DRAM) chips for a total of 256K of working memory. Central to both the PCTurbo-186 design and the expansion board that brings that design to life is the 80186 microprocessor, surrounded by its support chips, including two ROMs containing the PCTurbo-186's BIOS. The balance of the card holds the discrete logic integrated circuits that handle the detailed work of making the PCTurbo-186 happy in your computer—and your computer happy to have it.

The optional daughterboard can pile on enough additional 64K DRAM chips to bring the PCTurbo-186 memory total to 640K. As with your PC, you can add memory to the PCTurbo-186 in chunks, though it requires each chunk to be 128K. A bit more than half as long as a full-length expansion card, the daughterboard



PCTurbo-186

Orchid Technology
47790 Westinghouse Dr.
Fremont, CA 94539
(415) 490-8586

List Price: \$1,095 with 128K RAM;
\$1,245 with 256 RAM; \$265 for 128K
RAM add-on; \$495 for 256K RAM
add-on; \$725 for 384K RAM add-on.
Requires: 256K RAM on both the PC
and the PCTurbo-186.

CIRCLE 800 ON READER SERVICE CARD

snaps in place atop the PCTurbo-186 at the far end from the PCTurbo-186's edge connector, making a package almost a full inch high. Although the PCTurbo-186 takes up only a single expansion slot, it's a tight fit next to other cards in a normal PC, and tighter still in the sardinelike slots of an XT or Portable PC. You might want to reserve the slot next to the PCTurbo-186 for half-length cards such as IBM's Asynchronous Communications Adapter.

The PCTurbo-186's voracious appetite for power is evidenced by the hefty heat-sink mounted on its 80186 microprocessor. Its manual recommends that the card be given a home as close as possible to the PC's power supply to ensure that it gets the best access to the cleanest power.

The PCTurbo-186 comes in two speeds—one with a 6-MHz system clock and one with an 8-MHz clock. The higher clock speed means faster processing and a higher price (primarily because of the extra cost of the higher-speed microprocessor). I reviewed a unit equipped with the 8-MHz clock.

Orchid advises that these high speeds push a PC, which is built around a 4.77-MHz clock, to its speed limit and further warns that some manufacturers' expansion accessories for the PC might not be fast enough to handle the PCTurbo-186's power. When possible, you should package your PCTurbo-186 and all expansion cards in your PC's main chassis.

Installation

Installing the PCTurbo-186 hardware is completely straightforward. You just slide the card into the chosen slot of your PC. There are no switches to throw and no jumpers to move. All adjustments are preset at the factory. A good thing too, since the PCTurbo-186's documentation skimps

on what does what among the DIP switch settings and jumpers on the PCTurbo-186 card. As long as you don't change anything, that minimum of information should be all right, and the PCTurbo-186 I reviewed worked without adjustment or factory consultation.

Still, I found Orchid's attempt to simplify the software installation obfuscatory.

When you switch on your PCTurbo-charged PC, you are actually turning on two computer systems, each running DOS.

Following its instructions creates what amounts to the world's longest AUTOEXEC.BAT file. It contains few instructions, but it has more remarks than an Oscar Wilde play.

It's easier to understand the reason for the confusion than to understand the batch file itself. When you switch on your PCTurbo-186-charged PC, you're actually starting two separate computer systems, each running DOS.

First you must boot the host system—that's the PC. As usual, it first runs through its CONFIG.SYS file and installs any device drivers you might have for add-on hard disks and similar accessories. (Remember, the PC handles all disk input and output, so you must install the appropriate drivers in your PC's operating system.) Next, the PC looks through its AUTOEXEC.BAT file and runs whatever programs are necessary to set up the system.

When all that is done, you can wake up the PCTurbo-186, either by typing the name TURBO directly or by adding the appropriate entry to the AUTOEXEC.BAT file. The PCTurbo-186 loads its own copy of DOS from the boot disk, checks its equivalent of a CONFIG.SYS file named TURBO.SYS, and then, depending on the version of Turbo software you have, runs AUTOEXEC.BAT or its own version called TURBEXEC.BAT. The PCTurbo-186 then awaits your commands.

You can use software commands to switch between the PC's normal operation and PCTurbo-186 mode. Typing TURBO switches to the PCTurbo-186, and typing GOPC restores the PC to a semblance of normalcy. The two modes, normal PC and PCTurbo-charged, operate separately. You can exit from normal PC operation, play around with the PCTurbo-186, and return to the PC right where you left off. You'll be back at the drive and directory you were using in the PC mode, even if you changed the logged directory while in the PCTurbo-186 mode.

Both the TURBO and GOPC programs are smart enough to know which mode the machine is operating in, so demanding that your machine switch to the PCTurbo-186 when it's already in the PCTurbo-186 mode doesn't cause a problem. (The TURBO program also knows not to run AUTOEXEC or TURBEXEC other than when first starting up the system.) However, some programs are unable to tell which mode is currently active and will work only in the PC mode. To help you avoid running such programs in an inhospitable mode, PCTurbo-186 includes two utilities, ISPC and ISTURBO, that indicate the active mode by setting an error level in a batch file.

(continued)

PC TURBO

In addition, the PCTurbo-186 package includes utilities for installing a high-speed RAMdisk in the PCTurbo-186's 16-bit memory and for allocating part of the PC's 8-bit memory as a printer spooler. Diagnostics and a configuration utility complete the PCTurbo-186's bundled software.

Speed Tests

Don't expect that adding a PCTurbo-186 will cut the time that you sit at your PC in half. Normal daily use hardly stretches the inherent capabilities of even a regular PC. In fact, your computer just idles away most of the time, awaiting your next keystroke. Only rarely does even the most CPU-intensive program get bogged down by a PC's processing speed. (Of course, one reason for that is that most programs have been written with the 8088's capabilities in mind.) About the only chores CPU-intensive enough to test the limits of a PC's capacity are compiling a lengthy program or recalculating a spreadsheet the size of a spinnaker on a 12-meter yacht.

To find out how much processor time the PCTurbo-186 could save me, I chose to test the time it took to compile a medium-length program with the IBM Macro Assembler. First, I let an unenhanced PC grind away at it. It finished processing 2 minutes and 22 seconds later. When I compiled the same file with the same assembler, the PCTurbo-186 in charge, compile time fell to 1 minute and 4 seconds, just 45 percent of the straight PC's time (or 225 percent faster, depending on how you play with the statistics.)

I was particularly impressed with the PCTurbo-186's performance with IBM's version of the Logo language. Logo is a powerful language, but on an ordinary PC

it thinks at a lackadaisical pace. Seasons can change while it chews on a lengthy problem. On the PCTurbo-186, however, it snaps through the toughest procedures as if Logo were a compiled language. Turtle graphics become so speedy that they look animated.

I tried calculating the square root of 2 to a thousand decimal places (try that with

When I tried to
save a WordStar
file, PCTurbo was
out to lunch.
Something seemed
amiss with its file
access scheme.

BASIC some time). On an ordinary PC, this task took Logo a leisurely 3 minutes and 30 seconds. The PCTurbo-186 cut 2 full minutes off that time, a speed increase close to the boost you get from using assembly language.

Using WordStar with the PCTurbo-186 was interesting, to say the least. I could move from the beginning to the end of lengthy file in a couple of seconds. Full-screen scrolls snapped by—speeding up the familiar waterfall of changing lines so much that the bottom half-dozen lines occasionally seemed to “bounce.” Single-line scrolls were even more amazing—they didn't flicker as the screen was updated. Reformatting a 3,000-word manuscript took 57 seconds; the same document took an unaided PC 97 seconds to reformat.

But when I tried to save the file it seemed like the PCTurbo-186 was out to

lunch. WordStar appeared to take an ungodly long time to save my medium-length document. Something seemed amiss with the PCTurbo-186's file access scheme.

To check the point, I tried the standard PC Magazine disk reading and writing tests. It took my PC 2 minutes and 40 seconds to write 20 1,024-byte records 10 times to a floppy disk and 18 seconds to a cartridge Winchester. The PCTurbo-186 added a second to each of those times. That's entirely understandable. Everything going to disk still had to go through the PC, so the PC's times were the foundation of the PCTurbo-186's times.

(At least, that's what I thought until I checked the access time of a RAMdisk emulator built into the PC's memory. The PC took 10 seconds for the test; the PCTurbo-186 took 7 seconds. I can only report these results; I cannot explain them.)

My measurements made the lengthy WordStar waits understandable—everything else in WordStar was happening so fast that the file access times only seemed interminable. Timing WordStar with a stopwatch confirmed my theory.

The PCTurbo-186 does hasten reading disk files. The cache memory that the PCTurbo-186 builds in your PC's RAM gives its hard disk-reading speed a big boost. Running the standard PC Magazine disk-read test took my unaided PC 15 seconds; the PCTurbo-186 took only 5 seconds. Moreover, when using the PCTurbo-186's optional floppy-disk caching mode, the 2-minute-plus floppy reading time tumbled down to the same 5 seconds. Lightninglike, indeed.

The floppy caching system defaults to off because the PCTurbo-186 has no way of checking when you change disks. Consequently, it may assume that something is

still on the disk in the drive slot that, because of a disk change, is no longer there. That error might lead to important files not being saved properly or the encountering of some really strange disk reads. Orchid wisely advises that the floppy disk caching feature be left to "advanced programmers."

Teething Pains

As with many advanced hardware products for the PC, PCTurbo-186's weakest feature is its support software. In fact, about 10 minutes before press time and after I had completed most of my testing, a revised software version was dropped on my doorstep. Needless to say, I was delighted to run through all my experiments a second time.

The revised software, Version 1.2, solved some minor annoyances of the original but created a few problems of its own. The original software's screen handling was less than smooth. Some screen scrolls snapped into place with a quick flash, others bounced at the bottom. At times, the screen would not completely update until a key was struck.

The revised software, on the other hand, allowed the PCTurbo-186 to snap through screen updates without a hitch. Although some screens became jumbled during really fast scrolling, everything looked fine once the scrolls were completed.

Using the original software, DOS's DIR command acted strangely. The disk directory whizzed by until the final entry, then halted for 5 to 10 seconds before finishing up. Version 1.2's software made directory displays function quickly and smoothly.

But, far from solving one of the original's quirks—jumbled screens when

switching from PC mode with a 40-column display to Turbo mode with an 80-column display—the new version made it worse. After leaving the Turbo mode for PC mode, I couldn't get back. The TURBO program loaded, acknowledged that the PCTurbo-186 was there, paused, then automatically transferred me back to PC mode. I had to cold-boot, switching the

As with many advanced hardware products for the PC, PCTurbo's weakest feature is its software support.

whole system off, to get back to the PCTurbo-186.

Just like the PC, the revised TURBO program's first action in life is to load the file AUTOEXEC.BAT. (The old version used a file all its own, TURBEXEC.BAT.) The new setup means that your entire AUTOEXEC.BAT file runs twice every time you boot up—once for your PC and once for the PCTurbo-186. That could be good or bad for your computer (it was bad for mine because I run an incompatible program in my AUTOEXEC file), but it's definitely hazardous to your mental health. This aspect of PCTurbo-186 behavior is completely undocumented, and it may take you a while to figure out what is going on.

The new version of PCTurbo-186 software does offer substantial improvement over the original, including DOS 3.0 compatibility; Hercules display card support;

new, understandable messages at startup; a fix of a printing bug (which never bit me); and improved disk caching. Presumably the few remaining bugs will have been swatted by the time you read this review.

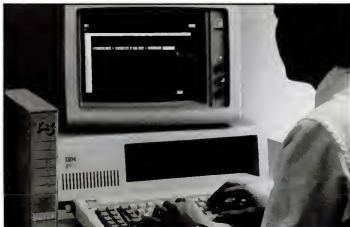
Incompatibilities

Because the PCTurbo-186 is a whole computer in itself—and one that is not made by IBM—it can transform a true-blue PC into a mere PC-compatible. As with other PC-clones, the PCTurbo-186 will run most programs written for a standard PC, but some software packages (those that require hardware-specific features of the PC) will not execute properly, and may not execute at all. The only way to be sure whether or not something will work is to try it.

One particular incompatibility stands paramount. The one place where a big speed boost would be most welcome is with interpreted BASIC, but that's one of the places the PCTurbo-186 can't help. I tried typing the magic word BASICA while in PCTurbo-186 mode and then watched my machine reboot and crash. The only way I could bring it back to life was to switch off the entire system and power up again. This was upsetting, but the PCTurbo-186 manual does warn that IBM BASIC won't work with the PCTurbo-186.

The problem comes up because part of IBM BASIC is ensconced in your PC's ROM memory, and the PCTurbo-186 doesn't have direct access to it. Hence, if you need to run BASIC, switch to PC mode.

The PCTurbo-186 did prove to be compatible with *compiled* BASIC programs (at least the few that I ran on it). So if you write code in BASIC, your best strategy is



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PCTURBO

to hone your program in the PC mode, then compile and run it rapidly on the PCTurbo-186.

No Cheap AT

Orchid does not claim that the PCTurbo-186 will turn your PC into an AT—and it won't. Ultimately, the AT will be able to manage some mighty big programs using its 4 megabytes of memory. The PCTurbo-

With programs compatible with it, the PCTurbo will boost standard PC performance more than twice over.

186 is limited by its microprocessor to one megabyte of memory and by its design to 640 kilobytes. In all likelihood, the PCTurbo-186 won't be compatible with programs designed specifically for the AT's extra memory.

Nevertheless, the PCTurbo-186 has a big compatibility advantage over the AT. Even with the PCTurbo-186 installed, your computer can still run all the PC-compatible programs it could without the enhancement—all you have to do is turn off the PCTurbo-186. That's more than the AT can claim, since a good number of PC programs won't work on the AT at all. Moreover, with programs compatible with it, the PCTurbo-186 will boost standard PC performance more than twice over. That may be enough to restore family harmony and make you happy with your PC again.

CIRCLE 268 ON READER SERVICE CARD

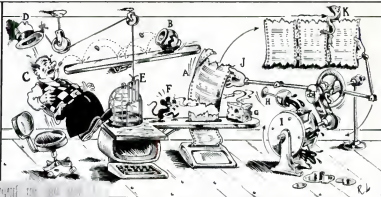
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MOUSE, INSPIRED BY SCENT OF PERFECTLY AGED GORGONZOLA CHEESE, GNAWS THROUGH SPREADSHEET, ONLY TO DISCOVER HE HAS BEEN FOOLED BY ALARM OF OVER-RIPED GORGONZOLA (G).

IN A FIT OF PIQUE HE SPILLS VINTAGE WINE (H) INTO WATER-WHEEL (I) WHICH TURNS PULLEY THAT CAUSES GLOVE (J) TO GRASP SPREADSHEET AND MOVE IT TO TAPING AREA.

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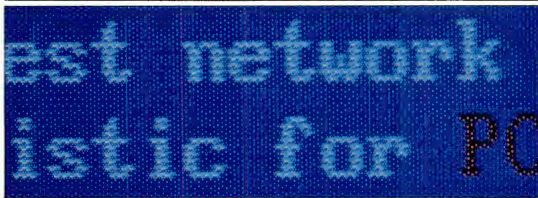
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IBM Sets a New Standard



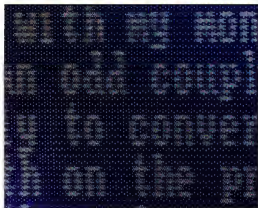
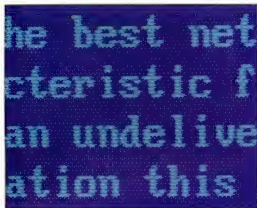
IBM has dropped a bombshell that will have a significant impact on the video adapter-board market. With the release of its new Enhanced Graphics Adapter card and Enhanced Color Display, Big Blue has, in effect, redefined the "IBM standard" for its systems and most compatibles. This new hardware establishes a consistent framework for higher-resolution graphics in both monochrome and color and also standardizes the display of more colors at each available level of resolution.

This release should stimulate the high-resolution graphics software market in the same way IBM's previous video standards did the market for today's graphics software and video expansion cards. Although IBM's old color and monochrome moni-

With the release of its new Enhanced Graphics Adapter card and Enhanced Color Display, Big Blue has set the stage for an explosion of more usable, high-resolution graphics software.

tors created two video standards, they had enough in common to have far-reaching implications. For the first time, software houses could write color graphics software with the assurance that a significant market existed, and third-party hardware manufacturers could design video expansion cards they knew would run in a large number of machines. Now, with the enhanced adapter and monitor, there will undoubtedly be an explosion of much more usable high-resolution software on the market. (PC will examine today's and tomorrow's video products in an upcoming issue early in 1985.)

The new monitor and adapter are both aimed at the mainstream of serious PC users—in fact, IBM has made a substantial effort to maintain the compatibility of



The closer you get, the better it looks: The old color card (right) can't compare with the Enhanced Display and adapter.

both products with its older systems.

The Display Adapter System

The new display adapter system consists of the Enhanced Graphics Adapter card, a Graphics Memory Expansion Card, and a Graphics Memory Module Kit. The adapter can be used with a standard IBM monochrome monitor, a standard IBM color display, or the new Enhanced Color Display. This new system, which is compatible with most existing

color and monochrome software, offers advanced graphics and text capabilities. The graphics resolution is 640 by 350 pixels on both the monochrome monitor and the Enhanced Color Display. Monochrome text is the standard 9- by 14-pixel matrix, but the adapter forms color text with a far superior 8- by 14-pixel matrix.

The number of available colors depends on how much display memory the Enhanced adapter contains. With 64K RAM on the base board and another 64K added by the Graphics Memory Expansion Card, the system can produce up to 16 colors from a palette of 64 in full 640x350 resolution on the Enhanced monitor or in 320x200 or 640x200 mode on a regular RGB (red, green, blue) color monitor. And by adding the Graphics Memory Module Kit, you get a total of 256K RAM, which allows for smooth scrolling and panning. The base board also has a RAM-resident character generator that can store 256 user-defined characters; the addition of extra memory brings the total character memory up to 512 or even 1,024 characters.

IBM claims the adapter system is compatible with programs written for either the monochrome or color display adapters. TTL (digital) RGB is the only output it supports; neither analog RGB nor com-

posite video outputs are supplied. Although the enhanced output is designed to work with a monitor that has a 22-kHz scan rate, individual software can adjust this scan rate, so users of the Princeton Graphics SR-12, which scans at 31 kHz, or other high-scan monitors are not necessarily shut out.

Either/Or

The new 5154 Enhanced Color Display can be used with either the new Enhanced Color Adapter or the older IBM color adapter—and presumably with third-party color cards. When used with the new color adapter, it can display the full 640x350 resolution in 16 colors as well as the high-definition color text. Its CRT uses an anti-glare screen with a 0.31-mm dot pitch. An interesting dual-scan-rate design allows the device to operate with either 15.75 kHz—the standard scan rate of an IBM color monitor—for compatibility or at 22 kHz for the new modes. Switching appears to be automatic, based on the polarity of the vertical sync signal supplied by whichever adapter card is driving the monitor.

Prices for the Enhanced color series are reasonable when compared with competitive products offering similarly advanced features. The base adapter is \$524, the



Enhanced Graphics Adapter

IBM Product Center

521 Fifth Ave.

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List Price: \$524; Memory Expansion Card, \$199; Memory Module Kit, \$259.

CIRCLE 783 ON READER SERVICE CARD

Enhanced Color Display

IBM Product Center

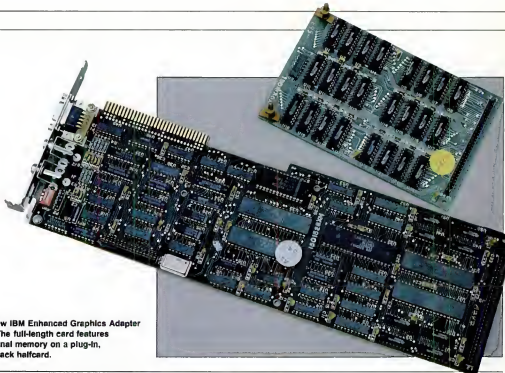
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CIRCLE 784 ON READER SERVICE CARD



The new IBM Enhanced Graphics Adapter card. The full-length card features additional memory on a plug-in, piggyback halfcard.

Memory Expansion Card \$199, and the Memory Module Kit \$259, bringing the fully configured board's total price to \$982. The new monitor is \$849.

PC was fortunate to receive the first sample Enhanced Graphics Adapter with a full complement of memory and an Enhanced Color Display just prior to press time. The adapter card, which was scheduled for shipment in October, should be available in December, but the monitor won't be released until January. Full documentation was not available at press time, so some interesting questions must go unanswered for now, but my hands-on experience with this new IBM hardware was fascinating and useful.

Easy Installation

The Enhanced Graphics Adapter (EGA) is very easy to install. It can coexist with either a monochrome or normal color card, or it can serve as the only video adapter in the system. Moreover, one four-position switch tells the EGA what other adapters are present and whether they or the EGA will be the primary video

source. If the EGA is the only card in the system, the PC motherboard switches are set to the "no monitor" selection; otherwise, the motherboard switches are set normally.

The EGA is a full-length single board of excellent construction quality. The additional memory is mounted on a half-length card that plugs into the EGA, but the combination still occupies only one expansion slot. The major video chips are not third-party, off-the-shelf items such as a Motorola 6845 or NEC 7220. Instead, they are custom devices designed by IBM and manufactured by AML. IBM reports that, while these chips are much more advanced than a standard CRT controller, their register design is at least related to that of the Motorola 6845 CRT controller that is used on most IBM video boards. This design makes sense given IBM's compatibility objectives. The rear panel of the card includes a standard 9-pin D-connector for attaching a standard color, Enhanced Color, or monochrome monitor. It also sports two RCA-type plugs, but the purpose of these are unclear since IBM

has stated that the EGA will not produce composite video.

The Enhanced Color Display, which looks both attractive and heavy duty, is made by a third-party source in Finland. Its styling matches existing IBM monitors, but its screen is much larger than a normal IBM or Princeton Graphics System monitor. Screen size appears to be at least 14 inches.

I first installed the EGA as the only adapter in the test PC and connected it to the new Enhanced Color Display. The system came up immediately with no problems. The first items that caught my attention were the new color text font and the high quality of the monitor. It exhibits absolutely none of the annoying flicker you get while scrolling with the older IBM color system. The text font is vastly superior to the old color font. It is a "thick" font that uses multiple dots horizontally rather than a slim, single-dot font, but it is readable and clear. You could use it for all-day word processing—something that can't be said for the miserable font used in IBM's original color monitor. On the oth-

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IBM GRAPHICS

er hand, it is not quite up to the fonts used by such competitive 400-line cards as Persyst BoB and Sigma Dazzlers.

The enhanced monitor is extremely sharp and clear; it evidences no color fringing or misconvergence. Its deep black, antiglare screen and large character size make it easier to use over extended periods. And it has not only contrast and brightness controls on the front panel, but

two size controls on the rear that adjust the screen image in either normal or enhanced modes.

IBM kindly supplied a demonstration disk that shows off the capabilities of the new system. I found the demos impressive. The system writes to the screen very fast, and the monitor phosphor has no visible persistence, so you see no "ghosting." A brief animation sequence amply demon-

strated the system's ability to create multicolored output at high rates. One demo created four windows, within which high-speed 16-color graphics were displayed, while others showed the fine gradations of color that the system can produce. These demos show abilities light-years ahead of the older color system's.

I tried several commercial software programs designed for the normal IBM

More Explosive News

IBM's new graphics products are meant for the professional market, but the advanced developments will eventually filter down to the average PC user.

In addition to the Enhanced Graphics Adapter card and Enhanced Color Display, IBM has announced other new graphics hardware and software. While PC hasn't received any of these new products from IBM as of press time—we'll review everything as soon as we can get it—we believe the IBM announcements have such far-reaching implications for the industry that each of the product press releases deserved more than a cursory look.

According to IBM, the Professional Graphics Controller is a real heavy-weight in more ways than one. It operates in two modes; one that emulates normal PC graphics but with a high-resolution 16- by 8-pixel matrix text, and another that offers 640×480 definition with 256 simultaneous colors drawn from a palette of 4,096. IBM claims the PC emulation mode will run "most" existing PC color software. The enhanced mode can draw—and can rotate, translate, and scale drawings—in two and three dimensions. In addition, the board has several other high-level graphics functions in its 64K of graphics firmware. The hardware includes an 8-MHz 8088 and 320K of display storage. The board can draw as much as 5 amps, so IBM warns against installing it in a standard PC and suggests instead using an

expansion chassis, an XT, or an AT.

The companion Professional Graphics Display is an analog RGB monitor that is capable of displaying the full 640×480 output of the Professional controller. It operates in noninterlaced mode, has a 13-inch antiglare screen, a .31-millimeter pitch CRT, and a horizontal frequency that measures slightly over 30 kHz.

At \$2,995 for the controller and \$1,295 for the display monitor, the Professional system is clearly well named because it is unlikely that it will find its way into many home PCs. On the other hand, the suggested list prices are not outrageous for business users of advanced graphics.

The IBM software announcements are equally exciting. IBM has put its stamp of approval (and thereby legitimized) the proposed *ANSI and ISO Graphical Kernel System*. This subroutine package can be used with FORTRAN, a new Professional FORTRAN that has just been announced, Latice C, or the IBM BASIC compiler. Another new product is the *PC Plotting System*, a subroutine package for use with the same host languages. It helps a programmer develop programs to produce charts, including area, bar, line, pie, scatter, schedule, step, and text-only charts.

A third subroutine package implements the proposed *ANSI Metafile Standard*. This is a method of generating, storing, and communicating two-dimensional graphics information regardless of the hardware or software used. In a way, it is analogous to a DIF format for graphics. IBM's support for the proposed standard will probably help assure the adoption of this very useful concept.

IBM also announced a *Graphics Development Toolkit*, a program intended for developers who write graphics applications. The *Toolkit* is basically an implementation of the industry-standard Virtual Device Interface, which allows programs to be run on any appropriate graphics hardware, and contains an impressive roster of graphics subroutines.

While some of these introductions are initially of greater significance to the professional market than to the average PC user, the IBM stamp of approval on the emerging industry graphics standards will eventually be of equal importance to us all. As in auto racing, where advanced developments filter down to the family sedan, the IBM software announcements will surely be a major impetus to ultimately bringing increased graphics sophistication to all PC systems.

—G.H.

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CIRCLE 224 ON READER SERVICE CARD

A Sneak Preview

Here's the inside dope on the IBM Enhanced Color Adapter card.

IBM's technical documentation wasn't quite ready when *PC Magazine* got the very first sample copy of the Enhanced Color Adapter card. IBM gave us just enough information to operate the board, no more. But that didn't even come close to satisfying our curiosity, and so we took a close look at the board itself.

Our initial inspection of the board didn't tell us much, adomed as it is with five custom LSI chips. There's also a 16K ROM chip on board. And it contains extensions to the PC's BIOS and

the mono and new color character sets. However, when we disassembled portions of it, we were surprised to find that the custom video chip bears an uncanny resemblance to that of the PCjr.

Palette assignment and setup of display attributes are remarkably similar to PCjr, except the BIOS code executes at a different address. The board remaps its on-board memory to segment A000H, enabling and disabling it dynamically. The BIOS checks to see how much RAM it has available and assigns it in 8K chunks. It also intercepts characters writ-

ten to the PC's normal video RAM addresses and, PCjr-style, remaps it into the display memory.

The display memory is dual-ported, meaning that it can be simultaneously accessed by the processor and the CRT controller with nary a flicker. Yet it imitates the PC's standard 6845 chip for the highest possible compatibility with existing PC programs.

We've seen the movie, so we now eagerly await the book—the board's *Technical Reference* manual.

—Bill Machrone

color system on the Enhanced products. *WordStar* and other word processors worked fine, and so did several games and other difficult color programs. However, *Flight Simulator* did not work. More importantly, although Lotus's 1-2-3 spreadsheets worked normally, 1-2-3 would not produce graphs (1-2-3's normal color drivers were installed). IBM reports that the Enhanced system's color compatibility is not complete. Software that writes through the BIOS should operate correctly, but programs that bypass the BIOS and write directly to the video hardware may function incorrectly or not at all. Software producers will have to prepare new drivers or else modify their programs for full compatibility with the Enhanced system.

Furthermore, I tested the Enhanced Graphics Adapter with both a normal IBM color monitor and an IBM monochrome monitor. Both configurations worked well. Monochrome text was displayed in the familiar 9×14 high-resolution font. Unfortunately, however, none of the IBM demo programs worked on the monochrome monitor. IBM did indicate that the preliminary demos were specifically written for the Enhanced Color Display, but I am not sure what this statement means

since one of the touted advantages of the new EGA is its ability to run graphics on the monochrome monitor.

The demos seemed to be written in compiled BASIC (at least BASRUN was on the sample disk), but I have no information on how to program the new high-resolution color (or monochrome) graphics or whether BASICA will be expanded to allow access to the new modes. I'll follow up when complete information becomes available.

I must confess that I had formed a certain preconception prior to receiving the Enhanced system. In a marketplace already populated with 400-line boards, I was initially disappointed with the published IBM specifications. Since the Enhanced system is destined to become an instant graphics standard, the 640×350 resolution seemed to be a fallback from the full 400-line capability of some of the competitive boards and monitors on the market. Similarly, the Hercules "standard" offers higher monochrome definition than IBM's new hardware. The rapidly dropping cost of hardware should also be pushing IBM to set more, rather than less, ambitious standards.

My discussions with IBM revealed that its primary motivation for the new designs

was compatibility with existing hardware and software. The 640×350 resolution was determined by considering the monochrome monitor's parameters rather than only those optimum for color.

My preconceptions were partially shattered after I actually used the new IBM hardware. The EGA card is a great product and the new Enhanced monitor is absolutely lovely. The color quality is excellent, and its fast screen updating is appealing. And the high-resolution color mode font is a great improvement, even though the 400-line systems do offer marginally superior fonts.

IBM's Enhanced hardware's real significance will be in its effect on software. Because the new standard will likely penetrate the market, it will result in better graphics software. The earlier IBM color standard allowed software developers to sell color graphics programs that could reach a wide audience with a common hardware environment. But the lack of consistency in high-resolution displays hampered wide-scale development of advanced graphics applications. The Enhanced system will elicit a flood of new high-resolution graphics software for both monochrome and color systems that will benefit us all. ■

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'Tis the Season to Use a PC

Christmas tree supplier Steve Seeberg believes PCs have as vital a place in the Christmas tree business as do lights and ornaments. He uses PCs to inventory nearly 9 million trees.

At this time of year, the Cadillac, Michigan, landscape belongs on a Christmas card cover. Thousands of postcard-perfect pine trees poke out toward overcast skies with their lush greenery juxtaposed against white, snow-covered hills.

It is a quiet time in this northern part of the Midwest. The summer vacationers are long gone. Even the omnipresent din of the lumbermen's buzzsaws has ceased for the holiday season. This is the time that Steve Seeberg closes the hard disk files he

keeps on his two IBM PCs in his Cadillac office and returns home to North Easton, Connecticut, with a boxful of floppy disks—knowing that his Christmas deliveries have all been made and that it's already time to start planning for next year's holiday season.

No, Steve Seeberg is not a computerized Santa Claus. But, nonetheless, it is safe to say that without him and his IBM PCs, Christmas this year wouldn't have quite been the same.

Seeberg's company, Emerald Tree, is





An artistic illustration of a person with long hair, seen from behind, sitting at a desk and using a vintage 1990s-era personal computer. The computer setup includes a CRT monitor, a system unit, and a keyboard. The background is a deep space scene with a large, bright blue planet or moon, a smaller celestial body, and a satellite or space station in orbit. The word "APPARAT" is written in large, white, serif capital letters across the upper middle of the image.

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the second-largest supplier of Christmas trees in the United States. In an industry with 10,000 registered growers, Emerald Tree is recognized as a heavyweight, with 8,000 acres of pine, Douglas fir, and spruce—an estimated holding of almost 9 million trees.

That's a considerable inventory for a small business to keep track of, and so last year, Seeberg, who used to be a tax lawyer, invested in three IBM PCs (one is in his Connecticut office), each with a separate 30-megabyte hard disk. The machines helped him create and maintain an inventory of each tree plantation. They also help him manage Emerald Tree's growing mail-order operation.

From Mainframe to PCs

For software, he selected *PC/Focus*, from Information Builders in New York, because he was already familiar with the company's mainframe program, *Focus*. He had used *Focus* on TimeShare, the on-line mainframe service he subscribed to until last season. That is, until he realized that the total cost of three PCs, auxiliary hard disks, and software would cost him the same as one busy season's worth of on-line time. "It came down to a matter of convenience and cost," he says about the purchase, adding that the *PC/Focus* program was surprisingly similar to the mainframe version.

The file system that Seeberg developed with *PC/Focus*'s financial modeling language includes a plantation inventory for every Christmas tree he owns. Since he runs his Christmas tree business 2 weeks per month from his Connecticut office, he employs independent contractors to prune and spray his Michigan tree holdings and pays them a per-unit wage. With computerized inventory control, Seeberg can track a "care history" of his complete tree holdings.

"I know everything that has ever happened to every tree. If something goes wrong, I have some idea of what has been done," he explains, mentioning that otherwise he would have had "only a

hunch." Until this season, he says, he had no cross-file of how productive each independent contractor was.

More than a Database

PC/Focus is more than a relational database. It provides its own financial modeling language, text editor, graphics, and the potential to link to *Focus*-driven mainframes via an asynchronous bus. As a result, the program has also allowed Seeberg to automate his mail-order business, which distributes trees nationwide via catalogs and department stores such as Neiman-Marcus.

His file system keeps track of all customer data, including names, addresses, and order history, which is re-used annually for Emerald Tree's mail-order marketing drive. The system even prints out shipping labels and manifests and creates credit-card authorization slips.

"The Christmas tree business is highly competitive. Anything you can do to streamline procedures helps give you an edge," he explains.

Shakeout

That edge is becoming especially important since, unknown to those who annually bruise their backs carrying home a 6-foot pine, there are growing changes in the Christmas tree business. The spindly Tannenbaums are generally 8 to 15 years old, and, since there was an abundance of planting 8 years ago, there was a massive tree crop this year. A subsequent industry shakeout is expected over the next 4 years.

When Seeberg talks about a "shakeout," he is not talking about the technique tree buyers use to test the life left in a tree. Seeberg's business and tax law background is considerably different than the stereotypical axe-wielding lumberjack, but he's confident that PCs have as vital a place in the Christmas tree business as do electric lights and ornaments.

"This industry has plenty of tradition," he admits. "But like Christmas, it is also a business." ■

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limitations if you're in the market for such an accounting system.

General Ledger

The simplicity of *The Shoebox Accountant's* general ledger module sets the tone for this back-to-basics accounting package. With it, you can establish a chart of accounts; enter, print, and post journal entries; and produce several basic financial listings and reports.

The chart of accounts is structured as follows:

NNNN . XXXX

where the N's represent the four digits of the financial account code, and the X's represent the subsidiary account code.

The financial account code is used for general ledger accounts (cash, sales, utilities, and so on), while the subsidiary account codes are used by the accounts receivable, accounts payable, and payroll modules for customer, vendor, and employee codes. Figure 1 illustrates how these accounts can be used to form your

SHOEBOX ACCOUNTANT

chart of accounts. You assign each account to one of the following predefined classifications:

ASSETS

- A Current Assets
- B Fixed Assets
- C Other Assets

LIABILITIES

- F Current Liabilities
- G Fixed Liabilities

EQUITY

- J Capital
- K Retained Earnings

GROSS PROFIT

- N Sales
- O Cost of Sales

EXPENSES

- R General & Administrative
- S Other Income
- T Other Expenses

When you establish an account, you can specify its "balance forward," or account balance, along with its classification and title or description. This is useful when you first set up your records. But once your records have been established, you can arbitrarily change any of these balances. The system requires that the net effect of altering account balances in this way maintains a balanced general ledger (so that debits equal credits), but there's no audit trail reporting of this type of change. You would have to keep this record separately, which defeats the point of the software. If you use *The Shoebox Accountant*, you should avoid altering

your account balances in this manner; use normal journal entries instead.

The Shoebox Accountant provides a rather unusual, albeit limited, budgeting capability. For each account, you can establish and maintain up to four different budgeted amounts. Each amount is assigned a budget number (1-4). What these amounts represent is up to you. For example, budget amount #1 could be a monthly budget for an expense item such as utilities and budget amount #2 could be the year-to-date budget figure for utilities. (Note that *The Shoebox Accountant* can't automatically total year-to-date figures—you would have to manually compute the new year-to-date budget each month.) When you request a budget-versus-actual financial statement report, you must specify which budget (1-4) you wish to use. Having more than one budget may be useful in certain circumstances, but it's incongruous in light of the simplicity of this system. A simple 12- or 13-period budget would be much more appropriate.

The Shoebox Accountant organizes all transactions into a set of journals that you establish (name) and assign a single-character alphabetic code. Valid journal codes are the characters A-Z, and each can be given a brief description. Whenever you prepare to enter a transaction, *The Shoebox Accountant* system asks you to specify into which journal it should record the entry. Thus, the journal controls the printing of your financial transactions prior to posting. Unfortunately, when you decide to post your transactions, all transactions are posted—those from the general ledger as well as from the accounts receivable, accounts payable, and payroll modules. There's no way to post transactions from only a single journal.

Each accounting transaction, whether a general journal entry or a transaction from the accounts payable, accounts receivable, or payroll modules, is automatically assigned a sequential entry number. The system employs a single set of entry numbers; that is, they are common to all of *The Shoebox Accountant* modules. As the doc-

ILLUSTRATIVE CHART-OF-ACCOUNTS

0100	Petty Cash
0110	Cash In Bank
0115	Investments
0120	Accounts Receivable
	(Control Account)
0120.AB01	Aaron Bakery Supply
0120.AW01	AutoWorld Supply, Inc.
	.
0120.XY10	Xtack Mfg Control
0130	Inventory
	.
0200	Accounts Payable
	(Control Account)
0200.LC01	Lippincott Custodial
0200.PG01	Pacific Gas & Electric
	.
0210	Federal Taxes Payable
	.
0600	Payroll Expense
	(Control Account)
0600.AB01	Abs Baker
0600.AR01	Alan Ross
	.

Figure 1: A sample chart of accounts from *The Shoebox Accountant*.

umentation suggests, this feature can enhance the audit trail and simplify control of your financial records, assuming you remember to annotate on the source document the entry number that the system assigns to each transaction.

The Shoebox Accountant is date sensitive but does not employ an accounting calendar per se. Many PC-based accounting systems tag each transaction with a number (typically 1 through 12 or 13) to indicate its accounting period, and the more capable systems can automatically assign the accounting period number based upon the transaction date. *The Shoebox Accountant* works solely on the date field of each transaction. For each financial account, the general ledger maintains an account balance and a record of the postings you've made to that account since the last update. This means that you must pay close attention to what transactions you enter, how they're dated, and for what effective date you request a given report. For example, when you produce a ledger-balances report dated January 31, 1984, it



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will include transactions for dates well past January, since when you request year-to-date data, this particular report ignores the report date in compiling and summarizing the transactions. On the other hand, a balance sheet report dated January 31, 1984, will include only those entries with transaction dates up to and including that date. As a result, these two identically dated reports will contain inconsistent data.

Reports available from the general ledger module include a listing of journal entries, a detailed trial balance, a summary trial balance, a funds flow worksheet, a listing of accounts, and two basic financial statements—the balance sheet and the income statement.

You can list journal entries chronologically, either by document number (a number you assign to each transaction) or by calendar date order. Unfortunately, only the account numbers—not the account names—appear on these journal entry listings, making it difficult to verify the accuracy of your postings. *The Shoebox Accountant's* detailed trial balance allows you to choose any specific range of accounts for any valid period (range of dates). The funds-flow worksheet simply lists the changes from the prior period to the current period for each account. This helps you create a historical cash flow for your business.

Three styles of financial statements are available: a standard statement (a formatted list of accounts and balances), a budget style statement (comparing the budget to actual performance and reporting the variance and the variance percentage), and a comparative style statement (showing current and prior period balances and the net change). For these statements, you can specify a title, a descriptive date (for example, "For the month ended . . ."), and a single 72-character footnote.

Accounts Payable

With the accounts payable module, you can establish and maintain information pertaining to each of your vendors; enter vendor invoice data; print, review, and

post these transactions; produce appropriate vendor payments (checks); and print several useful reports. As illustrated in Figure 1, the system makes use of the general ledger subsidiary codes to maintain records for each vendor. The vendor data is maintained within the general ledger—there is no separate vendor file. Note that in Figure 1, general ledger account 200 has been designated the accounts payable control account. (You use the general ledger module to establish control accounts for the other modules.) You can, in fact, set up several accounts payable control accounts to segregate the payables processing for different stores, divisions, or locations. For example, your chart of accounts could appear as follows:

0200 Accounts Payable (Store 1)
(Control Account)

0200.LC01 Lippincott Custodial
0200.RS20 Roemer Supply

0210 Accounts Payable (Store 2)
(Control Account)

0210.LC01 Lippincott Custodial
0210.MI02 Massara, Inc.

Each time you initiate the accounts pay-

able module, you'll be asked to which control account you want to direct your entries. The vendor subaccounts associated with control account 200, 210, or whatever will be used accordingly. This could be a very handy feature if you have such a record-keeping requirement.

Figure 2 illustrates the information maintained for each vendor. Here again you can see the results of CYMA's effort to keep the system very simple. For example, no year-to-date information is maintained for vendors, though this feature would be useful. All terms codes (offered to your customers by you and to you by your vendors) are maintained in a common file. You can establish up to 24 possible terms; for each one, you must supply a description and specify the number of days until due.

Figure 3 illustrates the screen used to enter vendor invoice information. Like all financial transactions, these entries are posted to the journal of your choice (in this case, the purchases journal).

After you've entered the invoice transactions, you can print a listing of them, make any necessary corrections, and then post them to the ledger.

The listing that lets you review entries prior to posting has two significant problems. First, there is no way to distinguish

(A) Add, Delete, or Change Accounts	
Copy Machines, Etc.	
Vendor Number:	BA10
Vendor Name:	Batee Paper House
Vendor Street:	235 W. Jefferson
Vendor City:	Phoenix
Vendor State:	AZ
Vendor Zip Code:	85002
Vendor Contact:	Allen
Vendor Phone:	(602) 354-2938
Vendor Terms Code:	A
Vendor Activity Date:	082283
Select Options:	
"C" Change Vendor	"D" Delete Vendor
"E" Enter Vendor	

Figure 2: You can add, delete, or modify vendor information using this screen.

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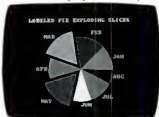
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SHOEBOX ACCOUNTANT

```
(B) Add, Delete, or Change Entries
      Copy Machines, Etc.
      Purchases (P)

Enter Number: 82
Vendor Number: BA10 Bates Paper House
Entry Date: 020584
Description: Supplies
Document: Inv4598
Offset Amount: 123.50
Offset Account: 0660.      Office Supplies

Document Total      Batch Total
              0.00              0.00

Press "RETURN" to Accept this Account
Press "F" to Fix Account Number
```

Figure 3: This screen shows a vendor invoice transaction being entered in the purchases journal. The expense is being charged (debited) to the office supplies account. At this point, the document and batch totals have not been updated.

between posted and nonposted entries. Second, it reports the accounts payable control and subaccount to which each entry was posted but does not show the offset (debit) account—you have no way of reviewing whether or not you made the appropriate account distributions. For example, the listing will show that you've recorded a payment due the utility company, but it will not show that the expense has been recorded against the utilities account.

Posting the transactions is simply a matter of calling upon the "post entries" function. As with the posting function in the other *Shoobox Accountant* modules, when you post transactions from one module, all unposted transactions from all four modules are posted. Although the system alerts you each time you do this, we believe it would be easier to control your accounting records if the program permitted you to post entries from each module individually.

The payment selection process, which initiates the printing of checks, is a bit unusual. To produce checks, you first select the entry numbers (the sequential number assigned by the system) of the

transactions for which you want checks printed. You can select or unselect individual entries or ranges of entries (regardless of the fact that some of the transactions to which these entries apply have nothing to do with accounts payable). What we find very strange is that, subsequent to this selection process, you are asked for which vendors you want to produce checks. Presumably, by entering the transaction number, you would have already selected the account payable for which you want a check printed. Furthermore, you are not given any means of reviewing a list of the checks that will be produced by the system once you proceed! And then, to top it all off, when you produce checks, you're given the option (as with all other *Shoobox Accountant* listings) of displaying them on-screen instead of printing them. If you do, the transactions will be posted, but you won't have any checks or any convenient way to produce them!

In addition to listing your invoice entries and producing a register of checks, *The Shoobox Accountant* offers three reports: an accounts payable (open-item) ledger, an aging report (produced with

transaction details or in summary by vendor), and a vendor listing. The aging report lets you specify the aging periods (1–30 days, 31–60 days, and so on).

Accounts Receivable

The accounts receivable module mirrors the functions of the accounts payable module. Customers are maintained with the general ledger subaccounts, and you can establish multiple control accounts if you need to separately account for receivables relating to different divisions, locations, or the like. You can establish control accounts for processing customer receivables on a balance-forward basis as well as control accounts for maintaining accounts in open-item detail. In the balance-forward case, the amounts due you from your customer are treated as a single running balance. Whenever a payment is received, the system automatically pays off the oldest invoice first. If you elect to use open-item processing, the document number you enter with each transaction will be used to match the billings (debits) and payments (credits). Payments applied to an open-item account without a matching document number will be recorded by the system as a credit transaction and will be carried by the system until an offsetting debit with the same document number is entered. The advantage of this system is that all of the customer detail is available (until matching transactions are eliminated during the update process). The balance-forward approach, on the other hand, saves disk space. But again, if you need both, the "shoobox" is smart enough to accommodate your needs.

Accounts receivable transactions are entered in two forms: Cash and miscellaneous adjustments are entered with the "add, delete, or change entries" function; billings are entered via the "print invoices" function. Before entering billing data, you need to set up product codes for each of the items you sell. For each six-character alphanumeric code you create, you must supply a product description and a single price.

The billing function is very simple. After entering invoice header information (including the invoice number, date, sales, and sales tax account codes), you enter the quantity and product code for the items sold. You can annotate each billing line with free-form text of up to 30 characters per line, and a message of up to 19 lines can be added to the bottom of the invoice. You can set up these general messages in advance and recall them with a single alphabetic character code.

The Shoebox Accountant also generates customer statements that show a detailed listing of the amounts due from the customer, an aging report, and, if you choose, a message of up to 10 lines.

In addition to listing entries and producing invoices and statements, you can produce an aging report (with transaction details or in summary for each customer), a customer list, and customer labels. As with the aged payables listing, you specify the aging periods in the accounts receivable aging report.

Payroll

The Shoebox Accountant uses what is typically called an "after-the-fact" payroll system. While it helps you establish and maintain payroll records for each employee, it does not actually calculate the payroll—leaving you the tedious job of computing each employee's pay and the associated taxes and other deductions. What the system will do is print payroll checks based upon whatever information you give it.

As in the accounts payable and accounts receivable modules, the payroll subsidiary ledger makes use of the four-character general ledger subaccount to track employee payroll data. Figure 4 illustrates the data captured and maintained by the system for each employee. Up to 26 different employee deductions can be established, and up to 8 can be assigned to each employee. For each deduction type (A-Z) you can assign a description, a dollar amount, and the general ledger account to which the deduction

should be posted. Figure 5 illustrates a completed payroll transaction for employee A. Baker.

Reports available from the payroll module include an employee list detailing all payroll data for each employee, employee mailing labels, and payroll checks. Each payroll check includes a check stub that specifies the current period and gives year-to-date detail.

Though this payroll system may be useful to a very small business for structuring payroll records, it is severely limited. For example, it makes no provision for

pay types other than regular or overtime, and it does not produce quarterly payroll filings, W-2 forms, and similar documents.

Documentation

The Shoebox Accountant comes packaged in—you guessed it—a shoebox! The packaging required to carry off the shoebox image is about six times as large as it needs to be to house the system's two disks and two 6- by 6-inch spiral-bound manuals.

The documentation is generally com-

```

(A) Add, Delete, or Change Accounts
      Copy Machines, Etc.

Employee Number: AB10
Employee Name: Bill Able
Employee Street: 2973 S. McClintock #293
Employee City: Tampa
Employee State: AZ
Employee Zip Code: 85284
Employee Social Security #: 293-74-9103
Employee Phone: (602) 966-3842
Employee Status: A
Employee Activity Date: 060283
Employee Rate of Pay: S
Employee Deduction #:

" C " Change Employee      Select Option:      " F " Enter Employee
" D " Delete Employee

```

Figure 4: The screen used to add, delete, or change employee data.

```

(D) Enter Current Payroll Entries

Employee Number: AB10      A. Baker
Current
Regular Hours: 40.000 :
Over-Time Hours: 4.000 :
Regular Pay: 300.00 :
Over-Time Pay: 45.00 :
Federal Taxes: -35.73 :
State Taxes: -7.36 :
Fica Taxes: -23.11 :
Car Allowance: -25.00 :
Insurance Premium: -10.00 :
Bonus: 0.00 :
: 0.00 :
: 0.00 :
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: 0.00 :
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ENTER " F " to FIX Previous Question

```

Figure 5: The screen used to enter payroll data for a hypothetical employee.

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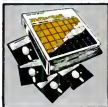
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PRODUCT REVIEW

Mini-Ledger

BY SAM PERKINS

Mini-Ledger just keeps getting better and, indeed, may now be setting the standard for the home computer market.

Since my first review of *Mini-Ledger* appeared ("Maxi-Value from a Mini-Ledger," *PC*, Volume 3 Number 1), Paradigm Consultants now has an updated Version 2.0.

In its original *Mini-Ledger*, I thought Paradigm had gone about as far as they could with a single-entry bookkeeping program without getting into complications that would make the program hard to learn.

If anything, this new version appears easier to learn and easier to use than earlier versions, in spite of its several new features. One of the main reasons earlier versions were easy to learn was because the program was written in such a way that it was not necessary for the user to know much about accounting. Essentially, if you could use your checkbook, you could use *Mini-Ledger*.

Checkbook Easy

The new version loses none of that simplicity and includes extensive on-screen help messages, in case you do forget what to do next. These messages are so comprehensive that they almost make the manual redundant. I say "almost make the manual redundant" because if you are completely new to computers and computer accounting, you should work through the exercises just to get a grasp of the major concepts.

One big improvement in the Version 2.0 manual is two sections at the back with good ideas of how to lay out your own chart-of-accounts. Following these are example lists of charts-of-accounts, perfect for people new to accounting in general, and to computer

accounting, specifically.

Data Input

The data input module of *Mini-Ledger* is still its core and its most sparkling feature. I don't think I've ever seen a program in which data entry was easier or faster. You make entries across the screen rather than down, which allows the program to keep much more data available on

having to re-type them.

New Features

In the first review, I did not think it was possible for *Mini-Ledger* to print a profit and loss statement because the program allowed the user to set up his chart-of-accounts any way he wanted them. That meant the program would have no way of knowing which codes were

account code list. Then when you are printing a profit and loss statement, the program asks for your starting and ending income and expense codes, and assigns amounts accordingly.

I particularly like the new bank statement reconciliation feature because it works so simply. It is a two-step procedure in which you mark the checks and deposits that have been returned by the bank (two keystrokes) and then let the program do the rest. All you have to do is enter the ending balance shown on your bank statement and the program lists all unreturned items, totals them, and tells you what your final balance should be. If the balance it finds in your data is the same, you get a message telling you that your checking account balances. If not, you get a message telling you how much you are off.

Multiple Accounts

A minor drawback of the earlier *Mini-Ledger* was that it would allow you to keep only one checking account and one year of data on a disk. Version 2.0 keeps up to 50 months of data on a single disk, stored in the same account or in several different accounts. If you were using only one account, you could conceivably keep 4 years of data on line at all times, providing some interesting studies of patterns.

Version 2.0 of *Mini-Ledger* is a significant improvement in a program which I already strongly recommended. In the process of making it both easier to use and more useful, Paradigm has opened a new market: the home computer user. *Mini-Ledger* was originally aimed at the business community and nothing has been done that diminishes it in that regard. Now the help messages and the bank-statement-reconciliation process make it an ideal program for home use. And at \$150 it is one of the most underpriced programs on the market. ■

* 3 - SORT A PAYCODE FILE

- * Your codes can be sorted either numerically or alphabetically.
- * The program works better if your codes are sorted numerically.
- * You might want to sort them alphabetically so you can have two
- * printed lists, one alphabetically, one numerical. That will make it
- * easier to find things. Remember to sort them back numerically
- * when you are finished.
- * PRESS ANY KEY TO CONTINUE

DO YOU WANT TO:

- 1 - CREATE A NEW PAYCODE FILE?
- 2 - CHANGE AN EXISTING ONE?
- 3 - SORT A PAYCODE FILE?
- / or ? GETS HELP MESSAGE

the screen where it can be seen. Programs that force you to "fill out a form" down the screen almost always present you with a new, clean screen each time you store an entry, making it cumbersome to go back to previous entries.

Mini-Ledger's speed of input is enhanced because you can copy items from above with the tab key rather than

for income and which were for expenses.

Version 2.0 does print a profit and loss statement complete with percentages. It gets around the drawback of not knowing how you have set up your codes by asking you. The new manual recommends that you put your income codes at either the top or the bottom of your chart-of-

Mini-Ledger, Version, 2.0

Paradigm Consultants, Inc.

39243 Liberty Street

Fremont, CA 94538

(415) 796-0543 (800) 821-8407

List Price: \$150

Requires: 128K RAM

SHOEBOX ACCOUNTANT

plete and well organized. It takes a light-handed approach at times—for example, the chapter on accounts payable is entitled "The Check's in the Mail," and the payroll material is found under "Good Help Is Hard to Find."

A glossary and helpful tutorial are included as appendices; the tutorial is tied in with a set of sample data contained on one of the disks. A third appendix contains the specifications for each of the system's files so you can access them with, say, a BASIC program. This is a relatively unique feature and could be quite useful if you want to access (but not alter!) your accounting records. You could, for example, transfer some of your accounting data to *WordStar*, *dBASE II*, *1-2-3*, or some other productivity or reporting tool.

Most *Shoobox Accountant* reports can be produced in a variety of ways. For example, you can choose to list a range of accounts, or to list only active accounts, and for several reports you can enter a special report title. After using the software for a while, you can avoid the prompts for specifying report formats by using the "autopilot" feature, which lets you create a file to store options for formatting reports. *The Shoobox Accountant* will remember your keystrokes, much like a macro in *1-2-3*, and you can set up different autopilot files for each kind of report.

Installing the program on a floppy disk system is a breeze (it takes only a few minutes). It's just as easy to install the system on a hard disk, but specific instructions for hard disk installation are not in the manual. When you purchase the system, you are provided with an account number and a toll-free phone number for remote support.

The Shoobox Accountant can help very small businesses handle their accounting chores. And many small businesses could benefit from improved record keeping. Unfortunately, there are some peculiarities in this package that make it less effective than it could be. Consider it as an alternative, but beware of its limitations.

—G. William Dauphinais

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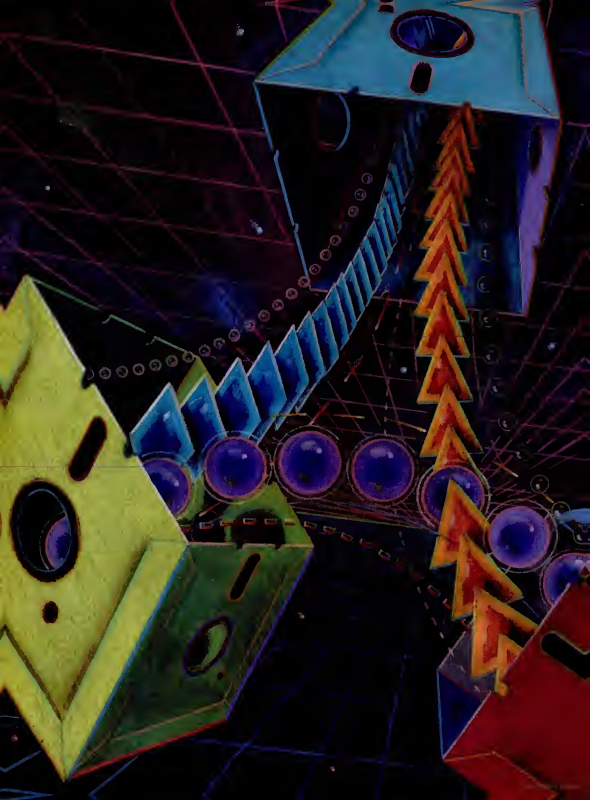


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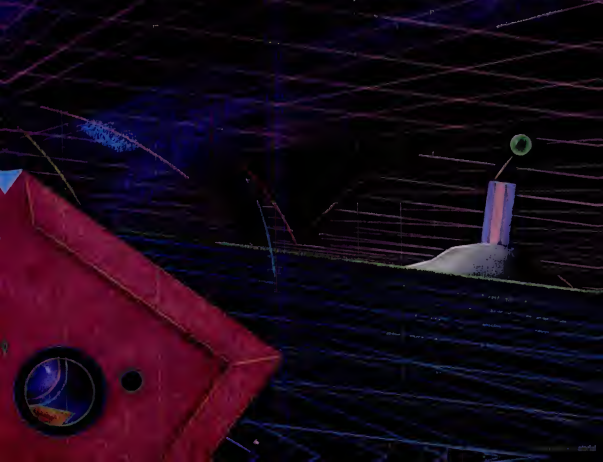


SOFTWARE • ANDREW N. SCHWARTZ

Get SMART To Fight Chaos

The three modules of Innovative Software's SMART series are each good enough to compete seriously with popular standalone packages.

Illustration: Andrey Dzelozeki



Innovative Software's *SMART* system sparkles from the moment you open the box. Everything, from the clear plastic slipcases to the package's total concept, is fresh and exciting.

The *SMART Software Series* is Innovative's contribution to the new wave of integrated software packages. "Integrated" has become the hottest buzzword in the software market. It's no longer enough to be good at only one thing—a package now has to be all things to all people. Rather than trying to superimpose new capabilities on a package originally designed as just a spreadsheet or a database, Innovative has created three standalone software offerings—the *SMART Data Manager*, *Spreadsheet*, and *Word Processor*—which, when used together, form an integrated whole that is greater (or, if you will, smarter) than the sum of its parts.

SMART's integration is achieved physically, logically, and in the user interfaces. Physically, data, files, and graphs can be passed from one module to another and incorporated into an application within the other module. Logically, you can direct *SMART* to initiate another module, carrying data with it. When I sent a block of data from a spreadsheet to a database, *SMART* carried me along with it—before

I knew it, I was in the database module.

Integration is also achieved in the user interfaces. Wherever possible, *SMART* uses the same formats for commands and menus in each of the various modules (although the commands and menu listings themselves are different for the three

The SMART Software Series is Innovative's contribution to the new wave of integrated software packages.

applications, as you would expect).

More than Menus

At the elementary level, *SMART* is a menu-driven system. Each module has five menu lists, each with various commands. In the menu mode, one of these lists is always at the bottom of the screen as you work in a module. To execute a command, you move the cursor to the key word of the subcommand and press the Enter key. To save time, you can type the first letter of the key word.

As with all menu-driven systems, however, experienced users will soon grow tired of walking through menus, and *SMART* has several ways of addressing this problem. For instance, some of the commonly used subcommands have "quick key" methods, typically using the Ctrl or Alt keys to execute subcommands immediately. Making things even easier, you can create macro keys to execute frequently used sequences of commands. Unlike some applications software, where macros are stored with the individual database or spreadsheet file, *SMART* allows you to store them in a separate file for use throughout the system. While you can

store and catalog the macros, unfortunately you can't edit them.

As you execute *SMART* commands via the menu mode, the key words you select from the menus appear on an information line at the bottom of the screen. As you type in the letters of the key word, the system begins to match it against its list of key words. For instance, if you type S, *SMART* might narrow the key word choices to Sort and Select. But by the time you type the O, *SMART* knows that you're choosing the Sort key word. The system will display the entire key word, and you press the Enter key to execute the command. Or, if you prefer, the command will be executed as soon as a match is made.

SMART also assists you in developing "canned" applications. You can build Project files out of *SMART* key words and commands which you (or someone else) can execute later. The Project files can be built in an editor or as you execute each command (*SMART* remembers each step). If you make a mistake or change your mind, you can always edit the Project file.

The system's outstanding variety of execution methods should satisfy the needs of novice users, experienced users, and applications developers alike.

SMART uses a common windowing capability throughout its three modules. You can have as many as 25 windows open simultaneously, with some of them appearing on the screen while others stay behind the scenes. Windows can contain data from any file or differing views of the same file. For instance, in the *Data Manager* you can look at detailed information from your SALES file in one window, summary SALES data in a second window, and your CUSTOMER file in a third window. Windows can be opened and closed at will, and you can zoom in on a particular window so that it fills the whole screen.

SMART explicitly supports subdirectories of DOS 2.0 or later, and during startup you can specify in which subdirectories

PC

The SMART Software Series
The SMART Data Manager
The SMART Spreadsheet with
Graphics

The SMART Word Processor

Innovative Software, Inc.
9300 W. 110th St., #380
Overland Park, KS 66210
(800) GET-SMART(T)
(913) 383-1089

List Price: *SMART Series*, \$895; *Data Manager*, \$495; *Spreadsheet*, \$495; *Word Processor*, \$395.

Requires: 256K RAM, two double-sided disk drives or hard disk, DOS 2.0 or later.

CIRCLE 790 ON READER SERVICE CARD

you want to keep the files for each of the three modules. Or, if you prefer, *SMART* will keep everything in the same subdirectory.

An unobtrusive and easy-to-live-with copy-protection method provides Innovative Software with the protection it deserves. After an initial validation procedure, I was able to boot up the program from the hard disks on my XT and AT without a system disk in the A: drive.

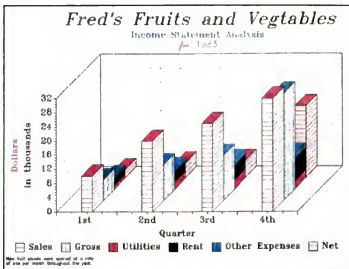
SMART relies heavily on the PC's function keys, which, for the most part, retain the same meanings throughout the three modules. A color-coded function key template is supplied with the system to help you remember what the keys do. (Templates designed for compatible machines are also available, at no extra cost.) Most of the routines tell you on help lines at the bottom of the screen which function keys apply.

The *SMART* system requires a PC or PC-compatible computer, 256K RAM, and two floppy disk drives or one floppy and a hard disk. A graphics card and a graphics monitor are required to view graphs and special fonts. A variety of printers and plotters is supported, as is the Microsoft Mouse.

SMART Data Manager

The *SMART Data Manager* offers a relational database capability that lets you do lookups in 24 files simultaneously. For applications in which the amount of data in individual fields varies a great deal, you have the option of declaring variable record lengths. Each data file can be indexed by as many as 15 keys, and a key can be one field or a combination of fields. These indexed keys are later used for record selection and sorting. A binary search technique speeds access to specified records when you select on key fields.

You can declare eight data field types in the *Data Manager*: alphabetic, numeric, date, time, Social Security number, phone number, sequence, and inverted name (an alphabetic field that sorts on the



This graph was drawn from *The SMART Spreadsheet and Graphics* module on an IBM color printer driven by a PC AT.

last word in the field).


File definition is easy and straightforward—it took me about 10 minutes to define a file of 15 fields. You can set up a password for the entire file, or you can use passwords to restrict access to individual, user-defined input screens. *SMART* makes extensive use of the function keys in the file-definition process. You can define calculated fields (storing the formula for the calculation with the database definition), read-only fields, and required fields, and valid ranges can be checked during data entry. Keys are normally declared while defining files, but you can also add or delete them later.

You can enter data either on the default screen or on any of the ten custom screens that can be declared for a file. You can design the custom screens to place fields anywhere on the screen and to include text, lines, and boxes. You can retrieve data from one file and include it in another file if you have linked them on common fields; this feature can validate entries in a

table that *SMART* maintains in the cross-reference file.

You must explicitly update the key indexes after you've entered new records or changed any key field. Even if you've changed a data field that is not a key, *SMART* asks you if you want to update the keys. The system knows only that the record has changed, not that the keys have remained the same.

Reporting in *The SMART Data Manager* is handled in the Form format, the Table format, or in a combination of the two. The Form format allows you to define the precise placement of fields on the page for printing on preprinted forms such as purchase orders or tax returns. The Table format produces the typical row-and-column type report, with fields as columns and records as rows. Combining these two methods allows you to print records from two files linked by a common field and produces a page with both a table and a form. Future enhancements of *SMART* will probably allow linking of more than



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Perhaps the most significant aspect of Smart Software is its unique "project processing" capability. It allows the user to set up customized projects, like a monthly sales report system or multi-year business plans, simply by doing them once.

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Smart Software is currently available for the IBM PC, IBM PC/XT, the new IBM PC/AT and IBM compatibles.



The Smart Software System
INNOVATIVE
Software

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**The \$10 charge for the disk is refundable with the purchase of any Smart Software.

CIRCLE 272 ON READER SERVICE CARD

two files in the reporting process.

The number of reporting options is so extensive that setting up a report can become tedious. For each numeric field, you must answer nine questions, indicating column headings, level of precision, justification, comma option, currency sign, percent sign, negative number format, and truncation options. A special Form option speeds the definition of mailing labels. I never did learn much about the combination Form/Table report format, since that example was omitted from the manual.

Specifying the sort order for a report is accomplished through the ORDER command, which allows you to choose the order in which you view or process records. You can order the file based on a permanent key, or you can specify a temporary key with the SORT or QUERY commands.

The SORT command allows you to rearrange the order of records in a file based on new sort criteria that you had not thought of before. QUERY allows you to include only certain records in a report or on the screen, based on specified conditions. Once selected, this QUERY subset is used until the file is reordered. This capability saves time by storing screening criteria for multiple reports that use the same data subset.

The SMART Data Manager can output to files in comma-delimited and fixed ASCII, DIF, M-SYLK, and SMART formats. Data can be imported in only ASCII comma-delimited and SMART formats, however, despite the documentation's claim that the system can import other formats as well. You can append an external file to an existing SMART file, easing the maintenance of SMART files from an external source. The fields in the external file need not be in the same order as the SMART file's fields, nor do they have to be the same length. Updating or replacing fields in existing records, however, must be accomplished with the transaction-processing capability.

It's impossible to cover the full range of

features and capabilities of SMART's excellent data manager in this short review; you must see it for yourself. If you need a full-featured relational database, you should consider *The SMART Data*

The SMART Data Manager can output to files in comma-delimited and fixed ASCII, DIF, M-SYLK, and SMART formats.

Manager, whether or not you're interested in the other SMART modules.

The SMART Spreadsheet with Graphics

The SMART Spreadsheet has about all the features you'd expect in a spreadsheet package, plus several unique features that make it outstanding in certain areas.

The SMART Spreadsheet can handle up to 9,999 rows and 999 columns in a single worksheet. It handles this huge number of cells by storing only those cells that have something in them and disregarding the others. Each cell can hold numbers up to 16 digits, text up to 80 characters, or formulas up to 600 characters long. Date fields are handled particularly well, with four major formats and nine variations.

As with the other SMART modules, you can display windows containing different views of a given worksheet or different worksheets altogether. The relational capability of *The SMART Spreadsheet* allows you to relate one worksheet to another and to reference cells on another worksheet. Using this multiple file access capability, you could easily consolidate monthly spreadsheets into an annual one. The cross-reference can be in the form of either a permanent or temporary link.

SMART worksheets can be either "resident" or "nonresident" in RAM. The

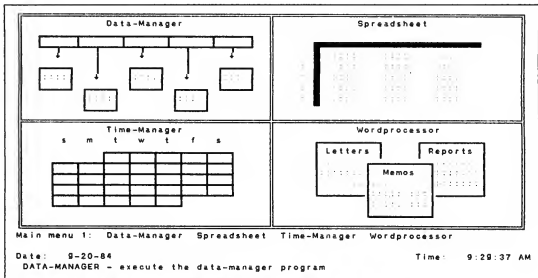
difference is that you can edit or change resident worksheets, while nonresident sheets are accessed on a read-only basis. In other words, you don't have to take up RAM space to display a file.

The SMART Spreadsheet module has such extensive graphics capabilities that Innovative Software could easily have split them into a separate package. It can create two- and three-dimensional bar charts; line and scatter plots; combination bar, line, and scatter charts; and pies and cakes too (a cake chart is a three-dimensional pie chart). High-low charts are available as well.

Graphics output can take several forms. If you use a graphics card with an appropriate color or monochrome graphics monitor, SMART will display the graph on the screen. If you have both a monochrome and a color display, you will get the graph on the color screen, and the spreadsheet will remain on the monochrome screen. Unfortunately, SMART does not support the Hercules graphics board with a monochrome screen at this time, although Innovative Software is working to make this possible.

For hard copy output, SMART supports a wide variety of printers, including the IBM and IDS color printers. (The accompanying three-dimensional graph, done on an IBM color printer driven by a PC AT, took almost 15 minutes to print.) The documentation shows switch settings and cable wiring diagrams for many of the supported printers. I found that my TI-855 printer handles the graphics very well. Many popular plotters are also supported, including models from Amdek, Calcomp, Hewlett-Packard, and Houston Instruments. SMART even supports the Polaroid Palette system. For those who need faster speed for calculations, the manual states that a later version of the spreadsheet will support the 8087 chip.

Graphs can also be written to a file in compiled form. Once you've done this, you can use the compiled graphs in a slideshow presentation, successively presenting a series of graphs on the screen at spec-



The main menu screen for *The SMART Software Series* shows the package's four major functions.

ified intervals, or you can call up the graph to include it with the text of a document from the *SMART* word processor.

Spreadsheet reports can include headings and footings, page numbers, single- or double-spaced formats, and multiple ranges—all on one report. Report formats, project command files, and graph definitions are stored in files external to the spreadsheet so you can use the same graph format for several worksheets.

The SMART Spreadsheet can interface with files within the *SMART* system by sending a block of data to another module. Data can be read into the spreadsheet environment if it has been written to a file by one of the other modules; a separate program and detailed instructions are provided for creating a PRN file from *J-2-3* and converting it to *SMART* format.

The SMART Word Processor

The SMART Word Processor can handle large files, since it can swap parts of the working document out to disk. As with the other *SMART* modules, multiple win-

dows are possible, permitting you to pull up other documents and do a "cut-and-paste" job.

Perhaps *The SMART Word Processor's* most outstanding feature is its ability to incorporate a graph into the body of a document. You can specify the graph's size

**The SMART
Spreadsheet can
handle up to 9,999
rows and 999
columns in a single
worksheet.**

and location within a paragraph and, although you don't see the graph itself on the screen, its location on the printed page is represented with a shaded area on the screen.

The Word Processor is visually orient-

ed—bold emphasis and underlining are displayed on the screen without extraneous characters, and words in different fonts are displayed in different colors on a color monitor. Twelve different fonts are available, or you can design your own. With an appropriate printer, you can print the different fonts in the enhanced printing mode, although at a much slower rate than normal.

I was impressed by the *Word Processor's* speed. It reformats paragraphs instantly, without the cursor delay that I find so annoying on other word processors. An entire document can be changed to double-spaced format instantly, with a single command. *The SMART Word Processor* has no automatic hyphenation feature, and this may partially account for its speed of operation.

To review your work, you can use the scrolling feature, which rolls the document before your eyes at a specified rate of speed.

A major shortcoming of the *SMART* system lies in its documentation. The

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manuals are very professional-looking—each has its own clear plastic slip case, is bound in three-ring padded binders, and is printed on glossy paper in three colors. But the manuals are filled with inconsistencies, inaccuracies, and typographical errors. For instance, the manual will say that a given command is to be found on command line 3, and you eventually find it on line 2. Sections of the manual disagree with one another, and it's up to you to find out which is right. I suspect that parts of the manual were completed before the system design was finished and the company didn't bother to see if anything had changed.

Were it not for these problems, the manual and the tutorial would be excellent. Initial tutorials show you the main features of each module, and you then proceed to a section of the manual called "Program Usage," which uses supplied example files to walk you through the execution of the main features. By the time you complete this section, you've a good idea of how to use each feature. The reference section comprises the bulk of each manual, explaining in detail how each command works and describing the various options. Fortunately, the reference sections were the most accurate parts of the manuals.

The manuals could also use re-indexing. Frequently, the index would refer me to an appendix, which would then refer me to the appropriate page in the manual.

Integration

The big question concerning the SMART system is not how well the individual modules work on their own but how well they get along as an integrated system.

I tested the SEND routine in each of the modules, passing data from one module to another. In the SEND routine, you do not name a file to which the data is to be written, but SMART obviously creates a temporary file since the disk-active light goes on during this process. Other than this disk processing, the procedure of moving data

(and yourself) from module to module works smoothly, as long as you keep some restrictions in mind.

Sending data from the *Data Manager* to the *Spreadsheet* worked without a hitch. Once I was in the *Spreadsheet*, even the column widths were set correctly. Moving the same data to the *Word Processor*, however, wrapped the line at position 127.



With one exception, the procedure of sending data from module to module works smoothly.

When I sent fewer fields, so that the width was less than this amount, the SEND process worked as expected.

Moving from the *Spreadsheet* back to the *Data Manager* worked well too, although a matrix inversion capability in the spreadsheet would have been nice, so that I could make columns out of my rows, which would then have become fields in the *Data Manager*. When I sent to the *Word Processor* from the *Spreadsheet*, I had the same problem with the line width as I had when I sent *Data Manager* data to the *Word Processor*. The bottom line is that, if you intend to include data from either the *Data Manager* or the *Spread-*

sheet in a *Word Processor* document, you need to be sure that the data you want to include will fit within the boundaries of your document.

Sending from the *Word Processor* to the other two modules works, but again you must bear certain constraints in mind. If you send to the *Spreadsheet*, each word, as delimited by a blank, will designate a new column. Therefore, there's no point in sending random text to the spreadsheet. If, however, you have a document file that includes a table of numbers, you could discard everything but the table and then send it to your spreadsheet.

Sending from the *Word Processor* to the *Data Manager* was the only one of the six SEND attempts that caused real problems. Commas and blanks are delimiters, but, for some reason, alphabetic fields did not transfer at all. Only the first four fields of a record were transferred, and each truncated record was included twice. Innovative still has some work to do on this leg of the SEND capability.

With this exception, the transfer of data and control from one module to the next worked smoothly and quickly. Note that you are resident in only one module at a time—you proceed from one application to the next and pass data as you go. According to Innovative, this separate protocol was implemented so each module could stand on its own and the SMART system could be used with multitasking operating systems. Innovative is developing a version of SMART that will run under the *TopView* environment on the IBM PC AT, and this environment will allow multitasking of the three modules.

A fourth, easily overlooked, component of the SMART system is its time management feature that comes with the master system disk. This electronic appointment calendar keeps track of meetings and scheduled activities on a daily, weekly, and monthly basis. You can display a daily appointment screen and add notes on each meeting or activity.

You can buy the three modules of the SMART system separately or all together.

Obviously it is not a TOPVIEW!

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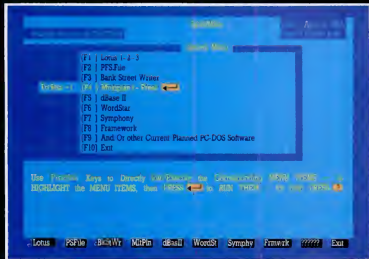
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GET SMART

Purchased separately, the *Data Manager* and *Spreadsheet* modules each cost \$495 and the *Word Processor* sells for \$395. The complete package is available at \$895, a savings of \$490 over the "open stock" price. Innovative has obviously targeted this product to compete with the best-selling software in each of the three categories—the company recently had a trade-in discount of \$195 for 1-2-3, dBASE II, or WordStar users.

Several new features currently in the works at Innovative will be available in free upgrades during the first year of ownership. The company is developing 8087 support for the *Spreadsheet*, which will speed calculations in large applications. In early 1985, the company will offer a communications capability for the *Word Processor* as a free upgrade and a spelling checker at a nominal charge. If you have an IBM color printer, a separate disk with the appropriate control codes will be sent to you on request. The DOS version for the PC AT and a UNIX version are also in development.

Innovative seems to have achieved a truly integrated, powerful system with tools that work well both separately and together. The modules' capabilities aren't forced into one another, yet in most cases you can easily pass data from module to module. Each contains most, if not all, of the features you'd expect in a comparable standalone product, as well as many qualities that set it apart from the rest.

The documentation needs to be reviewed for accuracy. It would be a shame if a user can't take full advantage of the system's many capabilities for lack of accurate and clear documentation.

Once people realize all that *SMART* has to offer, I expect that the system will play a leading role among the rash of integrated software packages on the market. ■

Andrew N. Schwartz heads his own computer consulting and development firm in St. Louis. The firm specializes in database management and information analysis applications.

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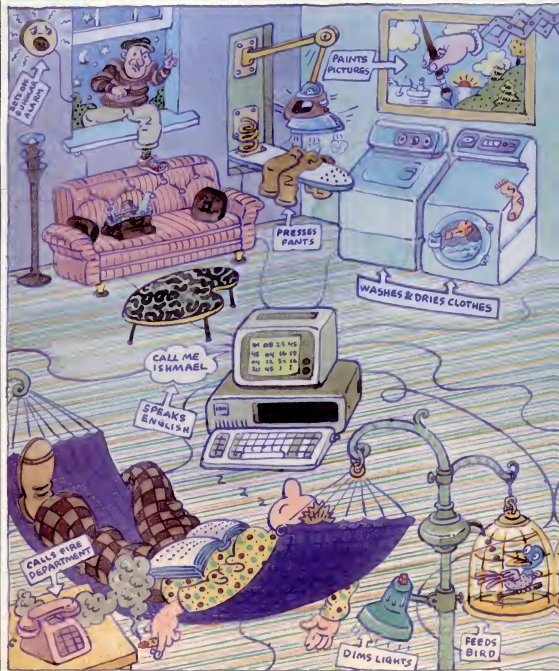
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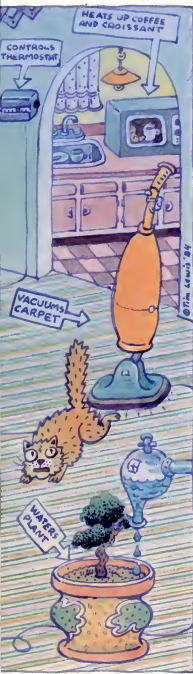
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Home Process Control: DOMESTIC HELP FROM THE PC

Would you trust your PC to wake you up in the morning or call the police in an emergency? If so, here's how to turn your PC into a general-purpose home controller.

If you're a typical PC owner, you use your computer for word processing, budget planning, database management, number crunching, and, occasionally, for a quick game of Blackjack. Well, now you can have your PC turn on your coffee pot in the morning, wake you up, call the police or fire department in an emergency, or use it for many other electronically controllable chores around the house or office. While you have probably read a few articles and ads extolling the virtues of the PC as an appliance controller or instrument reader, you may have been discouraged because you thought it would require elaborate add-ons, plug-in boards, and expensive software. Well, don't despair. There's a simpler way to use your PC as a general-purpose controller, using

its parallel printer connections. In fact, this article will explain how to address the connector pins on the adapter directly, how to set and to read voltages on specific pins, and how to operate various electrical devices under program control.

Printer Adapters

The IBM PC is specifically designed for printers with a parallel interface. For most PC owners, the printer adapter is supplied as a part of their IBM Monochrome Display and Printer Adapter cards; a separate Parallel Printer Adapter card is available for color-only PC's, and an equivalent add-on is required for the PCjr. A parallel printer interface is also included in many non-IBM special-function and memory expansion cards, making it one of

the most common PC options.

These various parallel printer adapters are equipped with a 25-pin D-shell female connector socket that is accessible from the back of the PC System Unit (see Figure 1 for the connector specifications). Actually, you can directly tap the various control signals appearing on this socket.

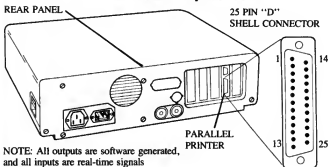
The Centronics Corporation has established a de facto standard for parallel printer interfaces.

However, if you plan to use a printer with a parallel interface, you will also need the usual cable with a 25-pin D-shell male plug at the PC side and a 36-pin Centronics male plug at the printer side (see Figure 2). The Centronics Corporation, a pioneer manufacturer of dot matrix printers, has established a de facto standard for parallel printer interfaces.

Interfacing to the Adapter

The parallel printer interface is to the serial RS-232 interface, used with serial printers, modems, and other devices, what a multilane highway is to a two-lane road. The parallel printer interface provides 5 inputs to the PC and 12 outputs from the PC, while the serial interface provides only 1 input and 1 output. Thus, one or more devices with a total of up to 12 inputs and 5 outputs can be controlled through the parallel printer interface. Such devices could be graphic plotters, voice synthesizers, burglar alarms, blinking lights, or relays. To harness the control potential of the PC, you simply attach those devices, instead of the printer, to the appropriate pins on the connector of your parallel interface card. A simple BASIC program can then write appropriate control signals to those pins or read their status.

Parallel Printer Adapter Interface Connector Specifications



AT STANDARD TTL LEVELS

Signal Name	Connector Pin No.
-Strobe	1
+Data Bit 0	2
+Data Bit 1	3
+Data Bit 2	4
+Data Bit 3	5
+Data Bit 4	6
+Data Bit 5	7
+Data Bit 6	8
+Data Bit 7	9
-Acknowledge	10
+Busy	11
+P. End (out of Paper)	12
+Select	13
-Auto Feed	14
-Error	15
-Initialize Printer	16
-Select Input	17
Ground	18-25

Figure 1: The connector specifications for the Parallel Printer Adapter Interface.

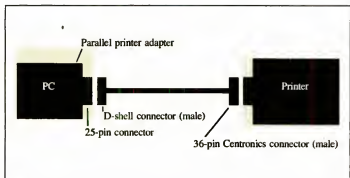


Figure 2: Cable connections between the PC and a parallel printer.

IBM Monochrome Display and Printer Adapter (MDPA)
IBM Parallel Printer Adapter (PPA)

Card Port Address (Data Port)

MDPA	3BC (hex), 956 (decimal)	Output from PC
PPA	378 (hex), 888 (decimal)	

Bit:	7	6	5	4	3	2	1	0
Connector Pin:	9	8	7	6	5	4	3	2

Card Port Address (Control Port)

MDPA	3BE (hex), 958 (decimal)	Output from PC
PPA	37A (hex), 890 (decimal)	

Bit:	3	2	1	0
Connector Pin:	17	16	14	1

Card Port Address (Status Port)

MDPA	3BD (hex), 957 (decimal)	Input to PC
PPA	379 (hex), 889 (decimal)	

Bit:	7	6	5	4	3
Connector Pin:	11	10	12	13	15

Note: Pins 14 and 17 use negative TTL logic. For example, ground is logical state "1" and +5 Volts is logical state "0."

Figure 3: Port and connector designations for directly accessing either the Monochrome Display Adapter printer interface or the separate Parallel Printer Adapter. The values used with the INP and OUT statements represent specific bit patterns as shown.

Port Addressing

The Intel 8088 microprocessor in the PC communicates with its peripherals by sending and receiving data to and from input/output locations, called ports. A port number (often called an address, but it should not be confused with a memory address) may specify the monitor, the keyboard, joysticks, serial or parallel printers, and other input or output devices.

The outputs of the parallel printer port are latched; that is, when a certain output is set to logical state 1 or 0, it remains in that state—unless explicitly changed—while the computer performs other chores. The printer driver software of the PC's Basic Input/Output System (BIOS) resides in ROM on the system board. For example, when the BASIC command LPRINT "Hello" is issued by your program, the BIOS software sets the appropriate voltage levels on the connector pins

For process control applications, the parallel printer port can be directly accessed.

of the Parallel Printer Adapter to activate the printer and to print the message. For process control applications, the parallel printer port can be directly accessed, which thus bypasses the printer driver.

Figure 3 shows the port and connector designations for directly addressing either the Monochrome Display Adapter's or the separate Parallel Printer Adapter's printer interface. Notice that these two interfaces use different port numbers, so you must make sure that your control programs (see BASIC samples below) address the ports your board actually uses. (Note: if you are using a PC-compatible, you will have to obtain the correct port numbers from your machine's documentation.) In this article, the examples use the addresses for the Monochrome Display Adapter and Printer

HOME PROCESS CONTROL

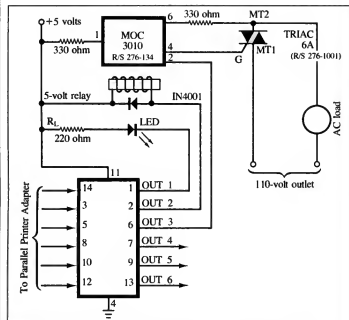


Figure 4: A simple and inexpensive interface circuit to control LEDs, relays, and AC-operated appliances or lights.

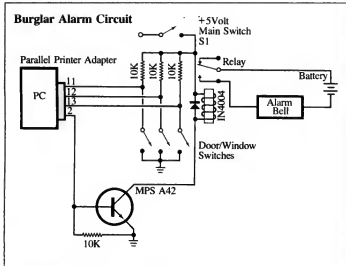


Figure 5: A burglar alarm that can be built for under \$50.

Adapter. If you are using the separate Parallel Printer Adapter, you simply change the 956 (shown) to 888, the 957 to 889, and the 958 to 890. Direct addressing of a port can be accomplished either from a machine language program or from BASIC with INP (port) and OUT port val statements. The variable port can be between 0 and 66,535; "val" can be between 0 and 255.

Although the 8088 can address up to 65,536 ports, the PC hardware limits the number of usable ports to 1,024 by ignoring 6 of the 16 address lines. Moreover, only a few of the 1,024 possible port addresses are actually used by the PC

Direct addressing of a port can be accomplished from a machine language program or from BASIC with INP (port) and OUT port val statements.

because a separate circuit is required for decoding and recognizing the address of a specific port. These decoding circuits are attached to the address and data busses—the internal "highways" through which the microprocessor communicates with memory and peripherals. Each port can handle the eight bits associated with eight separate inputs or outputs.

The values used with the INP and OUT statements represent specific bit patterns, as is also shown in Figure 3. The BASIC statement

OUT 956, 127

will set pin 9 of the 25-pin Parallel Printer Adapter connector to the logical state 0

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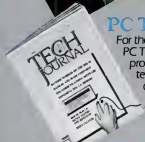
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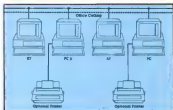


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CIRCLE 103 ON READER SERVICE CARD

(ground) and pins 2 through 8 to the logical state 1 (+5 volts), since 127 in decimal is equivalent to binary 01111111. (If you are using a separate Parallel Printer Adapter, you will use the statement, OUT 888,127.) Similarly, the statement

X = INP (957)

will assign to X a value corresponding to the state of port 957, which includes connector pins 10, 11, 12, 13, and 15. If, for example, pins 10 and 12 are set to +5 volts, pins 11, 13, and 15 are set to ground, and the remaining bits of port 957 are in logical state 1, then X will equal to $2^6 + 2^5 + 2^2 + 2^1 + 2^0 = 10^3$.

Interfacing of TTL Signals

Voltages at the 25-pin connector are at the transistor-transistor logic (TTL) levels. These levels, associated with a broad family of digital integrated circuits, are 0 to +.7 volts for the logical state 0 and +2.5 to +5 volts for the logical state 1. A 0 sent to the parallel printer port will thus generate between 0 and +.7 volts on the appropriate pins, and a 1 will generate between +2.5 and +5 volts.

The TTL logic circuits of the PC support only direct currents of up to 5 milliamperes (mA). If the device being controlled requires a larger current or voltages different from TTL levels, then additional interfacing circuits must be added. Figure 4 shows a simple and inexpensive interface circuit that can control LEDs, relays, and AC-operated appliances or lights.

The connector pins on the Parallel Printer Adapter are directly attached to the inputs of an SN75492 IC. This IC is a popular LED digit driver often used for multiplexed calculator displays. The six IC outputs act as "sinks," which means that the positive battery terminal should be connected to one side of the electrical load, such as lamps and heaters, and that the other side of the load should be connected to one of the IC outputs. When a 1 is then sent to the appropriate pin of the connector, the IC will "sink" the electrical current to ground, letting it flow

Building a Speech Synthesizer

Using parts available for under \$50 from a local Radio Shack, PC constructs a voice synthesizer for the IBM PC.

Lewart's discussion of voice synthesizers so intrigued me that I decided to construct two working models. One, a standalone version, was built on an ordinary 4-inch by 6-inch piece of perfboard and included his suggested power supply and the integrated circuit audio amplifier needed to drive a small loudspeaker (see Figure A).

When I first plugged it in, no sounds came out, owing to a defective IC. Replacing that chip and using Lewart's program brought the unit to life (see Figure 9 in the main article). My success with this standalone version encouraged

me to try my hand at building a second, deluxe version.

For the model shown in the photos and layout drawing (see Figure C and photos on facing page), I used a Vector 4313-1 circuit board, which is specifically designed for plug-in prototyping with the IBM PC. While the Vector board is a full-size expansion card (for \$34.95, it ought to be!), I cut it down to 4½ inches so it fits even in the shortest slot of my PC-XT. Since the Vector prototype board automatically picks up the +5 volts and ground connections from the PC bus, I didn't need a separate power

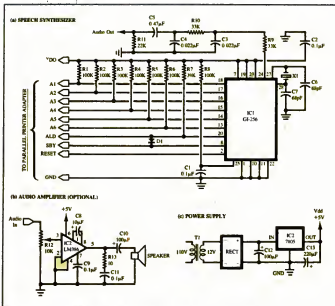


Figure A: Schematic diagrams of a speech synthesizer, audio amplifier, and power supply. See Figures B and C for construction details.

(Building a Speech Synthesizer continued)

DB-25 Pin #	Synthesizer Line (Fig. A)	MDPA/PFA Designation	Port Number (dec.) and bit
2	A1	DB0	956,0 or 888,0
3	A2	DB1	956,1 or 888,1
4	A3	DB2	956,2 or 888,2
5	A4	DB3	956,3 or 888,3
6	A5	DB4	956,4 or 888,4
7	A6	DB5	956,5 or 888,5
8	ALD	DB6	956,6 or 888,6
9	RESET	DB7	956,7 or 888,7
11	SBY	BUSY	957,7 or 889,7
18	GND	GND	

Note: +5 volts available from PC I/O bus, Pin B3 (see IBM Technical Reference).

Figure B: Pin, line, and port correlation for the voice synthesizer.

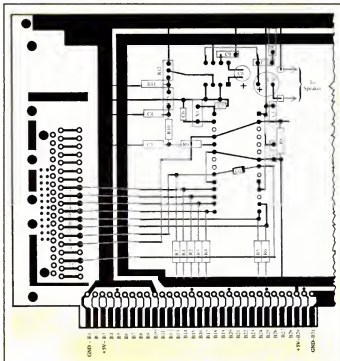


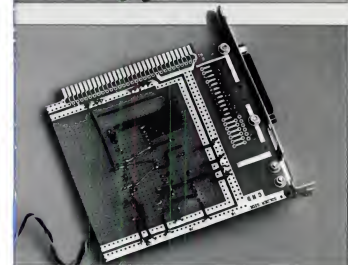
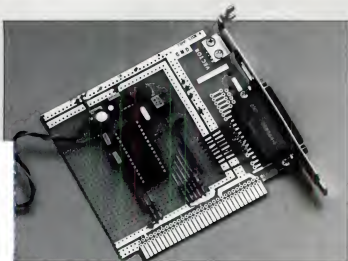
Figure C: The X-Ray parts layout. Gray-colored parts and wires are on one side of the board; Black-colored wires are on the reverse.

supply for this version. However, it did include the "optional" audio amplifier, a 386 op amp, which I found necessary in order to get sufficient volume from any of the several 2-inch to 4-inch speakers I tried. (The larger speakers tend to give better tone and volume but can be hard to mount inside the PC. One alternative is to connect the unit to an external hi-fi system, using ordinary shielded audio cable and phono connectors). To

Beyond watching out for short circuits created by solder bridges between closely spaced pins, you should not find construction of the unit difficult.

facilitate the connection of the synthesizer to the PC's Monochrome Display and Printer Adapter parallel port I used a female DB-25 on the back of the synthesizer card and a short male-to-male DB-25 jumper between the two boards.

Beyond having to watch out for short circuits created by solder bridges between closely spaced pins and observing that the banded (cathode) end of diode D1 goes to pin 8, not to pin 20 of the main IC, you should not find construction of the unit particularly difficult. Though electronically, the parts layout is not critical, I took much longer in wiring than necessary simply to avoid having wires physically cross each other on the same side of the board. Following this procedure, even if you are not accustomed to working from a schematic, you



The above photos depict the front and rear views of the PC synthesizer. They may assist you in building out your own board. The model shown in the photos uses a Vector 4313-1 circuit board specifically designed for plug-in prototyping with the IBM PC. Originally a full-size expansion board, I cut it down to 4½ inches so that it fits in the shortest slot of my PC-XT, since, as all of us know, full-length expansion slots are a scarce resource. As for resources, the parts list to the right should be a sufficient guide to most everything you need to carry out the project. Prices will vary according to local market conditions.

have a clear layout of the parts that is easy to follow.

In spite of the fact that as the Lewart explains, the unit's speech intelligibility is imperfect, building it gives you a fascinating opportunity to experiment with the sounds of speech. It's a memorable experience when, in response to the question, "What is your name?", your PC answers by reading the data line: 01,08,23,45,45,04,16,19,04,12,37,16,20,45: "Call me Ishmael."

—Craig L. Stark

Parts List

R1,R2,R3,R4,R5,R6,R8 - 100 kOhm, and ¼ W.

R7 - 39 kOhm, ¼ or ½ W.

R9,R10 - 33 kOhm, ¼ W.

R11 - 22 kOhm, ¼ W.

R12 - 10 kOhm potentiometer

R13 - 10 ohm, ¼ W.

C1,C2,C3,C4 - 0.022 MF

C5 - 0.47 MF

C6,C7 - 68 pF (may be either 47 pF or 100 pF—Ed.)

C8 - 10 MF/10 V. electrolytic

C10,C12 - 100 MF/35 V. electrolytic

C13 - 220 MF/10 V. electrolytic

D1 - silicon signal diode: 1N914 or equivalent

X1 - 3.12 MHz crystal (Or may be 3.58 MHz if you're willing to accept a higher pitch—Ed.)

IC1 - Speech Synthesizer IC (General Instruments 256)

IC2 - 7805 5 V. regulator

IC3 - LM386 audio amplifier

RECT - 50 V./1 A. bridge rectifier

T1 - 12 V./300 mA transformer

Misc - DB-25 connectors, IC sockets, and wire

Note: An individually tested GI-256 allophone IC is available from C&R Electronics, P.O. Box 217, Holmdel, NJ 07733 for \$18.95 ppd. New Jersey residents add 6 percent sales tax.

HOME PROCESS CONTROL

```

100 'Set pin 2 of MDPA port to ground
110 OUT 956,0
120 'Start 60-second exit delay loop
130 FOR I=1 TO 40000: NEXT I
140 'Monitor pins 11, 12 and 13 (bits 7,5 and 4)
150 '2^7 + 2^5 + 2^4 = 176
160 IF INP(957) AND 176 = 176 THEN 160
170 'Start 15-second entry delay loop
180 FOR I=1 TO 10,000: NEXT I
190 'Sound alarm, set pin 2 (bit 0) to +5 volts
200 OUT 956,1: GOTO 200
210 'Alarm will sound until turned off with switch S1

```

Figure 6: The BASIC program for the burglar alarm circuit (see Figure 5).

through the load. Similarly, if a 0 is sent by the computer, then no current will flow through the load. The maximum current that can flow through the SN75492 output is = 200 mA, which is sufficient for small relays and other similar devices. Figure 4 also shows the use of an MOC3010 opto-coupler and a TRIAC (a solid-state controller) to operate small AC motors and appliances.

If more than six connector pins are to be used for device control, then the circuit shown in Figure 4 can be duplicated. The same basic circuit can also be used to dim

Address	Allophone	Sample Word	Duration	Address	Allophone	Sample Word	Duration
0	PA1	PAUSE	10ms	32	/AW/	Out	250ms
1	PA2	PAUSE	30ms	33	/DD2/	Do	80ms
2	PA3	PAUSE	50ms	34	/GG3/	Wig	120ms
3	PA4	PAUSE	100ms	35	/VV/	Vest	130ms
4	PA5	PAUSE	200ms	36	/GG1/	Guest	80ms
5	/OY/	Boy	290ms	37	/SH/	Ship	120ms
6	/AY/	Sky	170ms	38	/ZH/	Azure	130ms
7	/EH/	End	50ms	39	/RR2/	Brain	80ms
8	/KK3/	Comb	80ms	40	/FF/	Food	110ms
9	/PP/	Pow	150ms	41	/KK2/	Sky	140ms
10	/JH/	Dodge	100ms	42	/KK1/	Can't	120ms
11	/NN1/	Thin	170ms	43	/ZZ/	Zoo	150ms
12	/JH/	Sit	50ms	44	/NG/	Anchor	200ms
13	/TT2/	To	100ms	45	/LL/	Lake	80ms
14	/RR1/	Rural	130ms	46	/WW/	Wool	140ms
15	/AX/	Succeed	50ms	47	/XR/	Repair	250ms
16	/MM/	Milk	180ms	48	/WH/	Whig	150ms
17	/TT1/	Part	80ms	49	/YY1/	Yes	90ms
18	/DH1/	They	140ms	50	/CH/	Church	150ms
19	/TY/	See	170ms	51	/ER1/	Fir	110ms
20	/EY/	Beige	200ms	52	/ER2/	Fir	210ms
21	/DD1/	Could	50ms	53	/OW/	Beau	170ms
22	/UW1/	To	60ms	54	/DH2/	They	180ms
23	/AO/	Aught	70ms	55	/SS/	Vest	60ms
24	/AA/	Hot	60ms	56	/NN2/	No	140ms
25	/YY2/	Yes	130ms	57	/HH2/	Hoe	130ms
26	/AE/	Hat	80ms	58	/OR/	Store	240ms
27	/HH1/	He	90ms	59	/AR/	Alarm	200ms
28	/BB1/	Business	40ms	60	/YR/	Clear	250ms
29	/TH/	Thin	130ms	61	/GG2/	Got	80ms
30	/UH/	Book	70ms	62	/EL/	Saddle	140ms
31	/UW2/	Food	170ms	63	/BB2/	Business	60ms

Figure 7: A list of vocal sounds, or allophones, that can be generated by the General Instruments 256A IC.

lights and vary motor speeds under program control by sending pulses with variable duty cycle to the control pins rather than sending steady signals.

Application Examples

Up to now, I have discussed the application of these ideas only in general. There are more specific uses. The simple circuit in Figure 5 shows a burglar alarm that can be built for under \$50. If one of the alarm switches closes, then the alarm bell will sound. The BASIC program to control this circuit is given in Figure 6.

When the program is started, a short "exit" delay loop allows you to leave the protected premises without activating the alarm. Similarly, the program has an "entry" delay loop to give you a chance to turn the alarm off with the switch S1 when you return. The program also latches the sensor switches so that even a momentary opening of a switch will turn the alarm on after the "entry" delay period.

Constructing a Synthesizer

The attached sidebar shows a more ambitious project, but still one suitable for home construction: a speech synthesizer that operates under PC control. Using parts available for under \$50 from a local Radio Shack outlet, it uses the "allophone" principle to generate words from individual speech sounds, or phonemes. The voice quality of allophone voice synthesis is not equal to that of the Pulse Code Modulation (PCM) technique used for telephone transmission or to the Linear Predictive Coding (LPC) method employed in Texas Instruments's Speak-and-Spell and similar devices. Nevertheless, this simple device permits you to create a virtually unlimited vocabulary simply with basic data statements that concatenate the individual allophones.

The heart of the synthesizer is a General Instruments 256A IC, which can generate 59 vocal sounds and five different-length pauses (see Figures 7 and 8). The BASIC program shown in Figure 9 generates four sample words and will serve as a

```
DD2-AO-TT2-ER1
KK3-AX-LL-AY-DD1
SS-SS-IH-SS-TT2-ER1
KK1-LL-AW-NN1
KK3-UH-KK1-IY
LL-EH-TT2-ER2
LL-IH-TT2-EL
AX-NG-KK3-EL
KK1-AX-MM-PR-YY1-UW1-TT2-ER2
EH-KK1-SS-TT2-EH-EH-NN1-TT2
TT2-UW2
AX-LL-AR-MM
SS-KK3-OR
FF-ER2
```

```
"daughter"
"collide"
"sister"
"clown"
"cookie"
"letter"
"little"
"uncle"
"computer"
"extent"
"two"
"alarm"
"score"
"fir"
```

Figure 8: Examples of words made from allophones.

```
100 ON ERROR GOTO 160
110 READ X
120 OUT 956,192
130 OUT 956,X OR 128
140 WAIT 957,128,128
150 GOTO 110
160 OUT 956,0: END
170 Generate 4 words: uncle, sister, collide, computer
180 DATA 15,44,08,62
190 DATA 04,04,55,55,12,55,55,13,51
200 DATA 04,04,08,15,45,06,21
210 DATA 04,04,42,15,16,09,49,22,13,52
```

Figure 9: A BASIC program to operate a voice synthesizer.

paradigm for your own programs, so that all you need to change will be the data lines. By inserting long pauses (see 03 or 04 in Figure 7), you can separate words in order to make a sentence. The shorter pauses are not distinctly heard as breaks in the sound but can sometimes improve the articulation of an allophonic word. Similarly, it is sometimes desirable to use the same allophone twice running to achieve the effect of a doubled consonant. In short, the only rule is: experiment.

The PC shows great potential for performing many chores that are usually associated with dedicated, programmable controllers. The use of the parallel printer port as the controlling element should open the

way for many inexpensive add-ons. In general, however, the controlling applications of the PC will not be limited by its capabilities but by your confidence in its reliability. Would you sufficiently trust your PC to let it control the thermostats, call the police and fire departments in case of emergency, wake you up in the morning and turn on the coffee pot? That decision is up to you. ■

Cass Lewart is the author of three books of computer programs. He holds a degree from the Federal Institute of Technology in Zurich and is a research engineer in communications and computer science at System Development Corporation.

Business Graphics On a Grand Scale

Microsoft's Chart takes in-house graphics one step closer to the quality of presentation graphics available from professional houses or \$50,000 computer graphics systems.

Until now, it seemed a bit absurd to compare Microsoft's *Multiplan* with major spreadsheet packages such as Lotus's *1-2-3*, *VisiCalc*, and *SuperCalc*. After all, other packages have had integrated graphics capabilities as early as 1982, while Microsoft tantalized us with promises that *Chart* would fill the graphics void for *Multiplan*—if only we could wait long enough. At last, however, *Chart* is available—either as a business graphics standalone package or as an adjunct to *Multiplan*—and it was worth the wait.

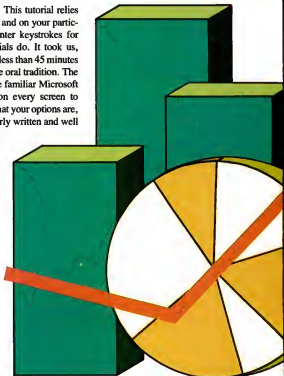
Chart requires an IBM PC, XT, or PC-compatible with 128K RAM (256K recommended) and an IBM Color/Graphics Adaptor or a Hercules Graphics Card. You should have a dot matrix printer with a graphics option for hard copy output; a high-resolution color monitor and a graphics printer or plotter are optional. If you go all the way with hardware, *Chart* offers up to 24 different type fonts and produces high-resolution color printouts, color slides, and transparencies.

Time to Learn

Chart's manual tutorial takes you through the essential steps of producing a

chart in only an hour. This tutorial relies heavily on the manual and on your participation; it does not enter keystrokes for you like on-line tutorials do. It took us, experienced chartists, less than 45 minutes to train a novice via the oral tradition. The program itself uses the familiar Microsoft menus and prompts on every screen to help you remember what your options are, and the manual is clearly written and well organized. On-line help screens can be called at any time by pressing Alt-H.

Chart's clear, easy instructions allow you to begin producing simple charts shortly after opening the package. However, you may find that a true artistic achievement may take a few more hours. *Chart* offers you a lot of flexibility to arrange your own graphic presentation. For example, you can move the headings and legend





CHART

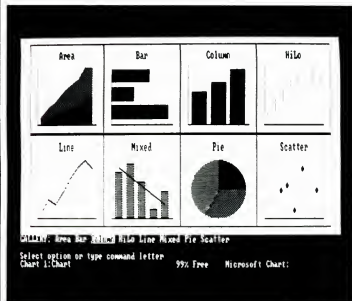


Figure 1: Chart's gallery offers a graphic selection of different chart types.

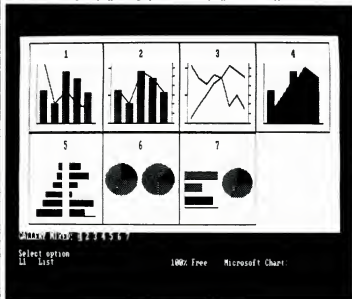


Figure 2: Chart's "mixed" gallery shows you how to combine different types of charts.

around anywhere on the page or change the patterns for each shaded area.

Moreover, since *Chart* gives you all the skills of an accomplished graphic artist without requiring you to learn about inks, rulers, light tables, and pressure graphics, you may find that the hardest part of producing graphics is deciding exactly what type of chart to create.

A Gallery of Charts

If you know the facts and the points you wish to emphasize, you don't have to be a graphic artist or a business presentation specialist to make professional-looking charts. *Chart* provides a menued gallery of eight basic chart types: area, bar, column, hi-lo, line, mixed, pie, or scatter (see Figure 1). In addition, each of these basic types—except hi-lo—offers up to eight variations, such as pie charts with exploded sections, overlaid bar charts, and stacked bar charts. You can even combine different types of charts by using the "mixed" gallery (see Figure 2). Once you've entered your data, you select a chart type from the gallery and then watch it being drawn on the screen in seconds. Furthermore, you can view your data in several different chart formats before deciding on the final form. You can be more fickle with *Chart* than with the old pen-and-ruler techniques.

In spite of how easy it is to change from one graph type to another, it's still true that the point you are making can significantly affect the type of chart you choose. For instance, consider how you would illus-



Chart

Microsoft Corp.
10700 Northup Way
Bellevue, WA 98004
(206) 828-8080
List Price: \$250

Requires: 128K RAM, one disk drive,
a color graphics card, any graphics
printer.

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trate the following statement:

"The nation's industrial output climbed 0.5 percent in June, so the index stepped up to 163.6, compared with the 1967 average of 100. This slight improvement on May's rate was due to increased auto production—which constituted 10 percent of all production in 1984," Federal Reserve System economists said.

Depending on the point you wish to make, you could depict the monthly rate output growth for the last 6 months, the industrial output index over the last 17 years, or the relative share of production held by major industries in 1984. The appropriate chart in each case might be a bar chart, a line graph, or a pie chart, respectively. *Chart* lets you set up two charts for side-by-side display (see Figure 3) or overlay charts. For example, you can compare two views of the same data by overlaying a line graph of the trend over bars that show the monthly figures (see Figure 4).

Because pie charts capture values at a fixed point in time, they are rarely used to show trends over time; a different pie would be required for each time period. Bar charts are more commonly used for comparing dollar values over time, such as net profit over the past 5 years. A traditionally good candidate for displaying information about many time periods is the line graph.

Entering Data

Before selecting your chart type from the gallery, you enter the data to be charted. The first screen you encounter in *Chart* is called the List screen (see Figure 5). This screen, with its menu of command selections across the bottom, will be familiar to users of other Microsoft products, such as *Multiplan* and *Word*. On the List screen, you use the NAME command to designate the name of each series of data you will be entering. For example, let's say you have monthly gross sales figures for the retail sales division, institutional sales division, and international

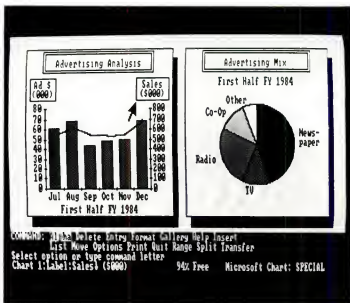


Figure 3: Chart allows you to view different types of charts simultaneously.

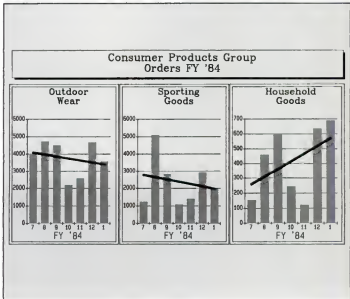


Figure 4: Chart lets you analyze and plot the trend of several data series.

CHART

Incl.(*)	Name	Source of data	Type	# pts.
1	R Retail	File: c:\acme:Retail	Date	6
2	I Institutional	File: c:\acme:Inst	Date	6
3	International	File: c:\acme:Intern	Date	6

COMMAND: **NAME** Chart Entry Format Gallery Help Include
 Modify Name Options Print Quit Transfer Xternal
 Select option or type command letter
 LI List 97% Free Microsoft Chart: ACFE

Figure 5: The List screen shows the name of each data series, the source of the data, the type of category used, and the number of points in the series.

	Month	Sales
1	Jan	10000
2	Feb	12000
3	Mar	12500
4	Apr	9000
5	May	13000
6	Jun	11500

NAME define series name: **Retail** value name: Sales
 category name: Month
 category type: (Date) Number Sequence Text
 category start: Jan 1, 1984 increment: 1
 increment period: Day(Month) Weekday Year
 Enter text
 LI Entry Series: Retail 97% Free Microsoft Chart: ACFE

Figure 6: The NAME command on the Entry screen.

sales division, and you want to graph the gross sales figures for each of the three divisions for each of the past 6 months. To enter the actual numbers in each series, *Chart* offers the choice of several different sources of data. Using the XTERNAL command, you tell *Chart* to get the data for one or all of the divisions from another *Chart* file or from a *Multiplan* worksheet. Data copied from a *Multiplan* worksheet can be linked to *Chart*—that is, the latest version of that data will be copied from the *Multiplan* worksheet every time this *Chart* file is opened.

The process of collecting data from *Multiplan* is awkward: you have to supply the cell ranges, and the spreadsheet is not as easily accessible as it is in other spreadsheet-with-graphics packages. *Chart* does help by letting you see a list of all the "names," which are labels applied to ranges of cells in *Multiplan*, from your *Multiplan* worksheet.

Chart alleges to use data from other programs, such as Lotus/WKS files, DIF files, and ASCII files. We did not test this facility, but judging from the initial awkwardness of even the simplest interface with *Multiplan*, we really don't believe it is likely to be a particularly streamlined process.

Of course, you can enter the series of figures directly for each sales division without referencing a *Multiplan* worksheet. You enter data directly on the Entry screen, using the NAME command to define the label for your data category, which, in our example, is months (see Figure 6). *Chart* lets you specify the increment of "months" you want. The program asks you to enter the starting month, and then it calculates the subsequent dates for you. You also define the label of the value axis, which in Figure 6 is dollars. Then all you have to enter are the actual dollar values.

One *Chart* file can include different data series collected from several sources. For example, each of the three divisions' figures can reside in a different *Multiplan* file or one division's figures can be

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entered manually on the Entry screen, while the other two are collected from *Multiplan* worksheets. You can selectively include one or more of the data series in each chart. For instance, you might decide to show bar charts for gross sales of the retail and institutional divisions but exclude international sales from the graph because they don't pertain to your current presentation.

The resulting chart can then be viewed by choosing the Chart screen. *Chart* takes the category and value labels chosen on the Entry screen as default values, but either label can be changed directly on the chart. It is from the Chart screen that the final tweaks are made to the chart (see Figure 7). The PRINT command sends the chart to the printer (see Figure 8).

Built-in Analyses

In addition to charting the figures you specify for each data series, *Chart* offers seven built-in analysis options, which you can run on your data. For each series, you can choose to chart the average, the cumulative total, the difference between adjacent values in the series, the rate of growth between adjacent values in the series (sometimes called the *smoothing function*), the relative percentage of the total represented by each item in the series, and the trend of the series. These values can then be charted over the other series.

The seventh option—analysis of statistics—is not included in the chart itself, but it gives you the number of points in the series, the maximum value, the minimum value, the average, the median, the standard deviation, and the correlation coefficient.

Creative Touches

Chart lets you select up to 26 different colors or shades and up to 24 different typefaces, depending on your output device. Differentiation among the many colors becomes nonexistent on most of today's lower-priced (under \$10,000) printers and plotters.

In addition, you can use simple

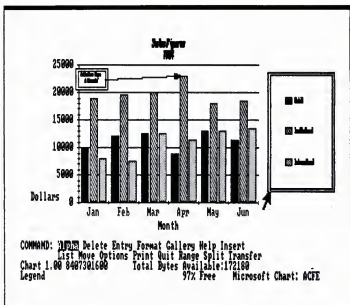


Figure 7: The Chart screen with the legend as the object selected to be altered.

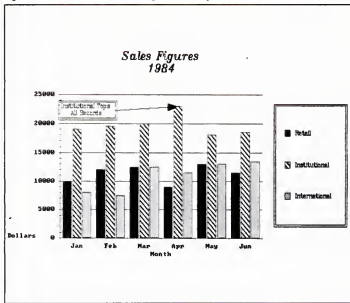


Figure 8: A printout of the chart on an Epson MX-100 printer.

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CHART

menued commands to change the chart's title or adjust the scale on the axes. Changing the size or position of the legend or changing the fill patterns—if you don't want the ones automatically selected by the program—is a simple process.

Once a chart is drawn based on your data entry, *Chart* lets you select each "object" on the chart by using the cursor movement keys. For example, to reposition the legend, you press the arrow keys until the word *legend* appears at the bottom of the screen and an oversized arrow is pointing to the legend on the chart (see Figure 7). Then, using the MOVE command, you simply use the arrow keys or the PgUp and PgDn keys to reposition the legend.

If you're accustomed to using a mouse to move around on Microsoft's other packages, you may find that object selection through use of the cursor keys is an awkward technique at first. Whereas you'll find yourself pressing the arrow keys many times to position the screen

Chart's ability to move the legend, the chart title, and the axes labels around on the chart with the arrow keys is unique. With these options, you can give your graphs a professional look.

marker, an experienced chartist might press the keys only twice. In either case, it's easy enough to choose any part of the chart and redesign it by selecting a new font or moving the legend or headings around. The screen redraw is slow, but

changes can be made more quickly if you choose not to redraw the screen after each individual change. After all the changes are made, the redraw option can be toggled back on, and you can see the changes at that time.

Five different frame types are available for the legend: a normal rectangle or a rectangle with a bevelled, double, rounded-corner, or shadow frame. A frame can be drawn around the entire chart. You can place tick marks inside, outside, or across the axes. You can also control the spacing between bars and columns and can even overlap them.

Chart lets you SAVE or LOAD your chart data, format, or both. The ability to load "formats only" means you can reuse a format that's your favorite, without having to redraw it from scratch each time you have a new set of data to chart. In effect, you have your own personal gallery of chart formats.

Chart also gives you the option of saving charts in SYLK format, which is a standard ASCII data storage format used in all Microsoft products for data interchange. Charts can be telecommunicated to other *Chart* users, regardless of the type of terminal. Using standard telecommunications software, you can even send charts from an IBM PC to Macintosh users in your organization.

These special options set *Chart* apart from most graphics that are integrated with spreadsheet packages; even those that allow a selection of type fonts don't offer the number of selections available with *Chart*. *Chart*'s ability to move the legend, the chart title, and the axes labels around on the chart through the use of the arrow keys is unique. If you make use of these options, you can give your graphs the polished look of professional business graphics (see Figures 9 and 10 for more examples of *Chart* graphics).

Output Options

You can make a print-out of the chart, the List screen (the list of data series), or the Entry screen (the contents of each data

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Strobe 260 plotter
Sweet-P 100 plotter
Sweet-P 600 Six-Shooter plotter
Texas Instruments 850 and 855 printers

Microsoft's *Chart* supports these printers and plotters.

series). To print the chart, you select from a list of several different output devices. *Chart* will appropriately adjust its automatic settings depending on the device you've chosen, and it will always show you only those font options that are suitable for your output device. At the time of printing, you set options that control the size, position, and page orientation of the chart.

The quality of graphics produced by *Chart* is largely determined by the output device and is usually measured by resolution in dots per inch. At the very least, you must have a dot matrix printer to print your charts. Even at low resolutions, *Chart* produces good-looking graphs. However, with high-resolution output, the program offers you a wider choice of fonts and shading patterns.

If you are printing on a color plotter, *Chart* asks you to select the pen size and pen speed you desire—either fast for plotting on paper or slow for transparencies. Plotters can have only a limited number of pens mounted at once, but *Chart* makes a note of this and acts accordingly. For example, if your plotter holds four or more pens, then *Chart*'s automatic color settings will not require manual pen changes. However, if you have manually selected more colors for your chart than your plotter is able to accommodate, or if your plotter holds fewer than four pens, then *Chart* prompts you for the first set of pens, plots the part of the chart that uses those, then prompts you for a second set of pens, and so forth.

Charts can also be output to laser printers. If you will be using *Chart* to produce presentation graphics for your best clients, you may find the high-resolution output devices worth the extra investment.

Whether your purpose is to clarify, simplify, stimulate, captivate, emphasize, summarize, persuade, or simply explain, your presentations have much greater impact illustrated with graphics. And, without a doubt, Microsoft's *Chart* will help you produce presentation-quality business graphics.

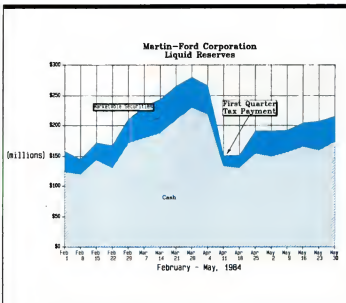


Figure 9: An example of an area graph produced by *Chart*.

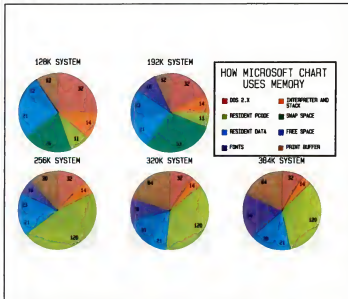
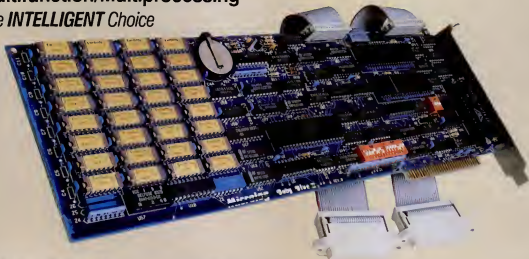


Figure 10: Multiple charts, such as pie charts, can be produced on one page.

Baby Blue II

Multifunction/Multiprocessing

The INTELLIGENT Choice



Packed with ALL the popular features:

- Up to a 256 Kilobyte Memory Expansion, optional in 64K blocks.
- Clock/Calendar with long-life battery back-up (choose replaceable or optional rechargeable battery).
- Parallel Port for use with IBM/Epson and most other parallel printers (addressable as LPT1: or LPT2:).
- Two (2) Serial Ports addressable as COM1: and COM2:, DR use our unique extended port addressing to configure for serial devices other than COM1: and COM2: (i.e. pointing devices, graphics tablets, etc.).
- Baby Blue II is fully compatible with the IBM PC, the PC/XT and other compatibles, including the Texas Instruments Professional Computer.

Not just another DUMB multi-function board.

With all that hardware to manage, we think a board should have a brain. You won't find this feature on other boards - they may look pretty, but they can be pretty boring once you get them home. Baby Blue II is actually a second computer inside your PC, built around the high-speed Z-80B microprocessor.

• Background Processing:

Compile, assemble, sort, calculate, communicate or print - all in the background, while you and your PC continue to work on other tasks in the foreground. Because it is a separate computer, Baby Blue II performs these functions without slowing down your PC, helping you to do more work in less time.

• Autostart at Preset Time:

Baby Blue II can begin any task, even a background operation, at a specific time by consulting the on-board real-time clock.

• CP/M Capability:

Baby Blue II offers instant access to the vast CP/M-80 library of mature, professional software for every conceivable application.

• Dual Ported Memory and I/O:

You can use Baby Blue II's memory, ports and clock as ordinary enhancements to your PC. Or, you can let your Z-80B micro-processor control the board directly, for truly independent background operation.

All this and SOFTWARE too . . .

Systems utilities

PDQ RAMdisk Software: create a FAST pseudo-disk drive of any size in available system RAM. The DOS 2.0 version lets you change the size of your RAMdisk from the keyboard.

Print Buffer/Spooler: a TRUE print spooler; the Z-80 buffers and manages printing independent of your PC. Unlike other so-called "spoolers", this one won't stop your printer or slow you down when you start another job.

Clock Software: sets Baby Blue II's clock and initializes the system clock at boot time - never type the time and date again!

Communications

Smart Terminal Emulator Package (STEP): talk to other microcomputers or connect to larger host computers, as an asynchronous terminal through Baby Blue II's serial ports. Unlike other "smart terminal" programs, STEP offers full emulation of popular video display terminals (the standard package includes Televideo 950 and Hazeltone 1500).

IBM 3101, DEC VT100 and many others are optionally available. You can send or receive text files, and with STEP's unique Sessions Menu, changing your configuration is a keystroke away.

BSTAM File Transfer Utility: Transmit and Receive text, HEX, and binary files (including COM files) without errors and without fuss. BSTAM is easy to use, with all configuration parameters handled transparently under STEP.

CP/M-80 compatibility

Baby Blue Conversion Software: Microlog's famous CP/M Emulator turns CP/M-80 programs into PC-DOS programs for fast, efficient execution on Baby Blue II. Completely transparent operation using standard PC-DOS commands - freely mix PC-DOS with CP/M programs and text/data files on the same PC-DOS disks.

Convert: supports bidirectional file transfer between PC-DOS and popular CP/M disk formats.

Keyfix: automates your keyboard with 54 programmable function keys for CP/M programs, eliminating tedious typing chores (max. 80 characters per key).

Baby Blue II (64K installed) \$ 695.

QUALITY you can count on . . .

Microlog is in the business of producing high quality, intelligent computer peripherals. Extensive factory testing gives our products one of the highest reliability rates in the industry. The finest components, connectors, and multi-layer PC board design, ensure years of trouble-free operation. We back all our products with a 90 day warranty and full technical support.

For more information on Baby Blue II and other fine Microlog products, see your micro-computer dealer or contact us:

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A TU INTERNATIONAL COMPANY

Microlog, Inc.
222 Rte. 59
Suffern, NY 10901
(914) 368-0353

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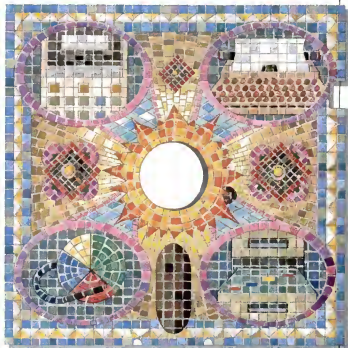
Baby Blue II is a trademark of Microlog, Inc.
CP/M is a registered trademark of Digital Research, Inc.
BSTAM is a trademark of Byron Software, Inc.
IBM is a trademark of your know who.
©1983 Microlog, Inc.



With its many functions, ease of use, and information sharing among functions, Softrend's AURA is a welcome addition to the burgeoning array of integrated software packages.

After Lotus' smashing success with 1-2-3, integrated software has become one of the hottest areas of new software development. It aims to provide in a single package several of the functions that people need most. So far, the most common function choices seem to be from among spreadsheets, graphics, database management, communications, word processing, and time management. The point of combining several functions into a single package is to make it easier to move information from one function to another, such as graphing data from a spreadsheet or including a graph in a document. How successful a package is depends a great deal on what functions it has and how well they work together.

AURA is a new integrated software entry that combines information management, a spreadsheet, business graphics, and word processing into a single system.



A New AURA For Integrated Software

Although you can work with only one function at a time, the functions can draw information from one another in virtually any combination that makes sense. For example, a spreadsheet can include data from a file in the information management function. You can draw a graph from data in a spreadsheet or an information management file, or from data you input directly. Graphs, spreadsheets, and diagrams (such as company logos or simple pictures that you might draw) can be included in a word processing document. By using data from an information management file in a document, you can produce personalized form letters.

AURA comes with a 545-page tutorial and a 337-page reference manual. The large tutorial volume is a testimony to *AURA*'s many functions rather than to any difficulty in learning how to use the package. The tutorial is nicely written and well illustrated with pictures of the screens you see at each step. The ten double-sided disks are stored in plastic pockets at the back of the reference manual and the whole thing fits into a colorful slipcover.

AURA runs from floppies or a hard disk. I strongly recommend using *AURA* with a hard disk, since handling the many floppies is very time consuming. If you have any problems, the technicians who answer Softrend's customer support telephone number are very helpful.

AURA is easy to use because it is totally menu-driven and its screens present more elaborate prompts than you see in many packages. When *AURA* asks you to make a choice among options, it shows all the

AURA combines information management, a spreadsheet, business graphics, and word processing.

options along with the code for selecting each one. When a prompt requires the name of an item you have created earlier, you can type in the name directly or you can scroll through all of the existing names that would be correct responses to the prompt. Names for files, documents, fields, Print formats, graphs, and so on can be up to 24 characters long. *AURA* keeps track of the proper DOS filenames itself. With a minimum of care, you can make your names both descriptive and easy to remember. *AURA* also has an extensive library of helpful explanations. You place the cursor on the field you don't understand, press the F1 key, and an explanation will replace part of the screen. All of this help makes *AURA*'s reference manual almost unnecessary.

AURA does a lot of its processing through what it calls a "format." A format is a set of parameters that control or describe a certain process that you can save for later use. You use formats to define files, data entry screens, reports, printed output from spreadsheets, graphs, page layouts, and so on.

Most of these formats have direct parallels in other software systems. For example, the File format performs the same function as the mechanism used to create a file in other data systems. Some formats, however, do not have parallels,

such as the Print format for spreadsheets. While you may print all or part of a spreadsheet without a Print format, using one makes it very easy to repeat an operation. The format concept and its consistent application throughout the package contribute to *AURA*'s ease of use.

A Responsible Manager

Softrend does not, fortunately, call its information management function a database manager. It is, in fact, a filing system oriented to single files. You put information in, and you can get it out again in a number of useful ways. But you cannot examine information from two files at once unless you transfer it from those files into a single spreadsheet.

Within that overall limitation, *AURA* has numerous features and a lot of flexibility. The number of files and the number of records per file are limited only by your disk capacity. Each record can contain up to 256 fields, text fields can be up to 255 characters long, and numeric fields can hold up to 16 digits. Up to 8 fields in a record can be indexed. You can use any field to select records for viewing or reporting, but indexing the fields you most frequently use speeds up retrieval considerably. *AURA* uses a fast and flexible B-tree structure for its indexes.

Defining a File format is very easy. You name the file and then define the fields. For each field, you choose a field type, such as character or date, and choose some general validation criteria and formatting rules for the field. You can require that all characters be entered, that a short entry be filled with a certain character, or that lowercase entries be converted to uppercase.

AURA also can perform special editing for a field, an option that is often not found in software systems. If you have a date field in which only entries later than 01/01/84 would make sense, you can tell *AURA* to reject entries that are earlier. To establish this check, you put in a free-form formula limited only by the three-line screen space ceiling. The validation for-



AURA

Softrend, Inc.
2 Manor Parkway
Salem, NH 03079
(603) 898-1896

List Price: \$595

Requires: 256K RAM, DOS 2.0
or 2.1.

CIRCLE 750 ON READER SERVICE CARD

mula can involve more than just one field, too. One specification might be `AMOUNT > 100 & DATE PAID > @05/01/84`. (The "@" sign tells *AURA* that the characters following it are a date.)

Generating a data entry screen is easy. Just type in the screen using regular text for titles. Where you want each field from the file to go, type a series of carets (^). One caret represents each character of file data. Then select which field is to replace each series of carets and how it is to be displayed. *AURA* lets you see the screen you are working on at all times. You can display the same field more than once, and you can use up to four screens to enter a single record for your file. You can define any number of screens showing the fields from one file, but only one file can be shown on a screen or series of related screens.

If you want a report to appear in a certain sequence, the Sort/Select format lets you identify up to nine fields for sorting. For each field you select an ascending or descending sequence and choose whether or not to treat all characters as uppercase for sorting purposes. At the same time, you select records from the file by entering a formula like that used for validation criteria.

You define reports in the same way you define screens—create your layout on a blank screen with text and carets, then determine which file field goes with each group of carets. *AURA*'s main limitations in this area are that a report can be only 80 characters across and that only fields from a single file can be selected. A field can be printed once per page as a title or in columns down the page.

AURA's file-handling capabilities are quite flexible, as long as you only need one file at a time. Given its ability to use file data in spreadsheets, graphics, and word processing, *AURA* would be a good tool for analyzing data selected from large computer files and transmitted to the microcomputer. Softrend told me that it does have plans for adding a communi-

cations capability to the package, precisely for this purpose. At present, however, *AURA* won't handle downloaded files without a lot of effort on your part, including detective work and programming that would exceed the abilities of most users. Since *AURA* keeps an internal directory of files so that you can use a 24-character name, and DOS can use an 8-character name, you would have to find a way to tell *AURA* about your downloaded file.

A Solid Spreadsheet

AURA's spreadsheet is nice but not spectacular, until you start including data from other *AURA* spreadsheets or from information management files.

AURA lets you copy a cell from another spreadsheet; it ensures that the copied cell always reflects the latest value. This fea-

If you want a report to appear in a certain sequence, the Sort/Select format lets you identify up to nine fields for sorting.

ture more than compensates for *AURA*'s small spreadsheet size—only 255 rows by 63 columns. Other spreadsheet packages use their larger size as a means of getting information from one group of related cells into another group performing a separate function. With *AURA*, you can use one spreadsheet for a single function, pulling information out of other spreadsheets.

When you are looking at a cell whose source is another spreadsheet and you want to see the calculation that supports

the value, *AURA*'s ZOOM command brings up the source spreadsheet. UNZOOM takes you back to the original spreadsheet.

AURA also lets you use data from an information management file in your spreadsheet. You specify the file and field and how to select the records. *AURA* lets you compute an average value for the field; choose the minimum or maximum value found; count the number of qualifying records; compute a variance, standard deviation, or sum; or extract the field from the first record selected. Instead of getting a report of information and then typing numbers from the report into your spreadsheet, you can let *AURA* act as both your source report and your typist. Each time you look at the spreadsheet, *AURA* does not recognize that a group of cells comes from information in the same records. For each cell, it has to go to the file and perform an extraction.

Good with Graphics

AURA supports line graphs, bar charts, stacked bar charts, and pie charts. It does not do high-low-close charts or scatter diagrams, but you can draw your own diagrams using primitive graphic forms, and combine graphic forms on a single page and adjust the scale of each independently. With this feature, you can lay out and adjust your graphics with the computer instead of the photocopying machine.

A large, square graphics area covers most of *AURA*'s graphics screen; a list of functions available to you is shown on the far right. This list changes depending on the option you select. For example, if you have elected to draw a diagram, the options offered include line, box, polygon, circle, arc, and text. The list of functions is a menu for the graphics system and is quite effective without taking up much space.

For drawing a graph, you might use information from the file management function or numbers you enter yourself. You have a great deal of control over the appearance of the labels, titles, and other

graph features. You can let *AURA* choose a scale appropriate to the values in the graph or you can set the scale yourself. This feature is important if you want to compare graphs generated at different times.

One annoyance is that after you add each new element to the graph, *AURA* redraws the whole graph using pixel graphics. This process is quite slow and, in the course of completing a graph, you may have to sit through it as many as four or five times.

Fair with Words

AURA's word processing function is, for the most part, quite ordinary. It shows you a menu on the upper third of the screen, which leaves room for your document on the bottom two-thirds. When you have learned the key commands well enough, you can get rid of the menu to allow more room for your text. If you press the F1 key and then type the number of one of the menu items, a subordinate menu or an explanation appears in place of the original menu. Help is always available at the touch of a key.

AURA will edit up to three documents concurrently, but the screen shows only one at a time. After making corrections, you must press the F10 key to realign the text in the affected paragraph. *AURA* shows you the line and column where the cursor is positioned but does not show page breaks. *AURA* has no provisions for handling columns or footnotes.

The only exceptional thing about *AURA*'s word processor is its ability to include information from the other functions in a document. All included items are static—they are not updated when the source changes—which makes sense, since a business document is usually designed to convey status at a certain time.

If you want to include a graph or a diagram, you either supply a name or let the system scroll through the available names and select the one you want. *AURA* draws the graph or diagram and then asks you if

that is the one you actually want. If it is, a line is inscribed in your document indicating the name of the graph or diagram that goes there.

When used with data from an information management file, the word processor will substitute the information from the fields you specify for the document areas marked with a series of carets. With this feature you can produce customized form letters that include, for example, each customer's name, address, and outstanding

You can produce customized form letters that include each customer's name, address, and outstanding account balance.

account balance. When you use this feature, one document will be generated for each record in the file. If you want to select records, you must do so before calling for the file in the document.

Extra Points

AURA includes two other important features. First, you can string a group of formats together and run them as a series. Second, you can set up your own menus.

Both of these features are for workflow control. Perhaps you would like to be able to delegate the work of updating information and generating printed reports to someone with very little knowledge of computers. By setting up a series of formats, you could guarantee that the steps would be accomplished in the correct order. By creating your own menus, you

could ensure that only terms familiar to your subordinates are used.

A Few Flaws

After using *AURA*, I am both enthusiastic and disappointed. *AURA* incorporates many good ideas in a well-tested and easy-to-use package. But, because of the pressure its makers were under to get it on the market, it is somewhat uneven. For example, *AURA* uses color in some unusual places and fails to use it where it could be very helpful. When you install *AURA*, you can tell the system that you have a color monitor and what color you would like. Unfortunately, the color you select is used for the background, not for the characters. Almost any color is overwhelming when you see an entire screen of it. You cannot change the color of the characters from white.

When you draw a graph from data in a spreadsheet, you can choose a black-and-white, high-resolution display or a color display of lower resolution. However, the graph comes up in white lines on a black background in spite of the selection of the color option.

While other word processors use color to set off boldface or underscored text, *AURA* simply brackets the affected text with a code letter—B for boldface and U for underscore. On the screen, the document text is displayed in white and the optional menu at the top in yellow.

It is hard to understand the erratic uses of color. Perhaps the area was overlooked because it is not an important selling point for *AURA*. Similarly, in each of the functions, some nice features have been included and some have been left out.

I think *AURA* is a fine first effort for Softrend. It has not come to the market as well rounded or as polished as Lotus' 1-2-3, but it is still an impressive accomplishment. Softrend has a solid foundation to build on. And at \$495, *AURA* is not only a good package, but also a good buy. In a year or two, with the minor flaws and oversights cleaned up, it could be outstanding. ■

A NOTED AUTHORITY SPEAKS OUT ON DATABASE MANAGEMENT.

"I've got 4 billion customers.
"The world's biggest
database.

"So I need all the power I
can get my hands on.

"That's why I use R:base."

"With R:base, I can access
billions of records. Open 40
files at the same time. Handle
up to 400 fields. And sort it
all out in a hurry. It's everything
I need to keep my lists in order.

"And if your inventory is
anything like mine, you'll
appreciate the programming
capability of R:base. It lets me
do conditional processing.
Post transactions. And update
multiple files from one input
form.

"But even with all that
power, the real gift is that it's
so easy to use.

"For starters, its on-screen
tutorial makes R:base a snap
to learn. And now, there's a new
applications diskette with
ready-to-use mailing list, inven-
tory management, and fore-
casting applications.

"Not only that, R:base is
designed to work with Clout.
That's the program that lets
me—and my elves—talk to
our personal computers in
plain English. Clout also
remembers where my
data is stored, and can
search for it across

all files. So I don't have to!

"And here's the best
package of all.

"For only \$14.95 (plus ship-
ping), Microrim will send you
a demo/tutorial packet of both
R:base and Clout. Just call
1-800-547-4000, Dept. 922
In Oregon, call 1-503-684-3000.
Or see your nearest software
store now.

"Because if your workload
starts to snowball, you could
end up out in the cold!"



R:BASE™ FROM MICRORIM®

Requires 256K of memory. Runs on MS-DOS and PC-DOS
operating systems. CP/M 80 requires 64K.

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Fortified with a laser printer and the appropriate front-end software, the PC can put high-quality, low-cost typesetting within the reach of most businesses.



TYPOGRAPHIC POWER FROM THE PC

The first draft of your 10,000-word proposal is almost finished. You have 17 pages of fuzzy dot matrix output and another 8 pages of graphs and illustrations. Since the proposal has to go to 50 branch offices, you'll be using 1,250 sheets of paper. Typically, you'd reformat the report for a letter quality printer, print it out, make some format corrections, and run a final version. The result: a pile of papers that looks like all the other proposals—boring.

Not all proposals need suffer this unfortunate fate. Consider another scenario. You load typographic software into your IBM PC, design a two-column page format, center the title on the top and the company name on the bottom, select 9-point Times Roman type style with 2-point line spacing, then load and format your proposal. The initial draft fills only 8 pages. Next, you add boxes for illustrations and tables, reformat the layout, then add subheads in boldface and call quotations to be set in large type. The final ver-

sion runs 12 pages; you set the pages on a laser printer, add the illustrations, and make your copies.

Eye-Catching

At almost every branch office, your proposal is read first. Compared to the thick typescripts piled before them, your report looks like a slick magazine article. It's concise and refreshing—and the captioned illustrations and tables complement the accompanying text. Chairpersons will no doubt have to remind committee members not to overlook the other reports.

This kind of reaction isn't improbable. Compugraphic Corporation, a major typesetting equipment manufacturer, commissioned a study at Boston University's School of Public Communications to test dot matrix, letter quality, and typeset formats. The study found that 85 percent of the subjects preferred typeset to dot matrix and letter quality formats, and reading speed for typeset material increased from 10 to 27 percent. The subjects also found

APPLICATIONS

typesetting more professional, persuasive, and credible than other formats.

PagePlanner and *Type Processor One* (see sidebar "Programs to Print By") turn the IBM PC into the front end of a typesetting system. They can handle such complex typographic tasks as hyphenation, justification, and kerning (letter spacing) and send final pages to a variety of typesetting engines. Both programs can drive commercial systems from Compu-graphic, Mergenthaler-Linotype, Itel, and AM-Varityper.

Commercial typesetting systems are too dedicated and expensive to justify such routine office procedures as printing out reports. Prices start at \$25,000 for front-end software and the output unit, and that figure doesn't include all the proprietary options available or the equipment needed to process the photographic paper. Furthermore, data exchange between most dedicated typesetters and personal computers can be difficult and expensive, and most systems require a skilled operator to keep them operating efficiently.

Technology has once again broken down barriers of the past, however. An IBM PC using front-end software and laser printers can now replace, for some users, dedicated typesetting systems. Laser printers have sufficient resolution (300 lines per inch) to support both letter quality and near-typographic quality. And they use plain paper. The price for a PC, a laser printer, and front-end software (between \$10,000 and \$15,000 depending on what you get) is within the reach of many businesses. This system represents a first step toward the typographic office, where typeset formats will be used for routine printing tasks.

Making Space

Besides being more legible, more readable, more persuasive, and more professional, typographic formats have one very practical advantage over letter-quality and dot matrix formats—type saves space. Because it's proportionally spaced, you can pack more characters into each line,

Programs to Print By

PagePlanner and *Type Processor One* now offer features once found only in dedicated systems.

It often happens that two people independently come up with the same idea. Jim Bessin of Ridley Park, Pennsylvania, developed *Type Processor One* at the same time that Ron Johnson was writing *PagePlanner* for Westminster Software in California. The two packages are striking in their similarity.

Type Processor One

Written in assembly language and compiled BASIC, *Type Processor One* was originally developed for a small regional newspaper. Bessin, who has been writing customized typesetting software for several years, recognized that *Type Processor One* had broader commercial applications, and started Bestinfo, Inc., to market it.

I saw *Type Processor One* in action at Guyre Associates in Windham, New Hampshire, a marketing firm that does most of its print production in-house. Robert Guyre, Jr., and Ron Downing handle all phases of marketing, from research to the final printed product, and have used in-house typesetting all along. They chose *Type Processor One* because

it combined a second input terminal with a previewer (manufacturers usually sell these separately). "We're impressed with the system," says Guyre. "Except for its printed documentation, which is its only weak spot, this package does everything we need."

Guyre's son, Rober Guyre III who operates the *Type Processor One* system, admits he has "no experience with type. I'm still learning to use the typesetter (an Itel Quadritek), but I've already mastered *Type Processor One*." He showed me several formats he'd created during the first two weeks he used *Type Processor One* on an IBM PC. They all involved intensive coding on dedicated typesetting systems.

Type Processor One uses two modes: composition and form-fill. The composition mode features interactive, real-time page editing. You can display page formats on a monochrome monitor, with headlines, columns, captions, and page numbers placed exactly where they will print, with relative size, weights, and spacing represented. Typesetting commands or text can be edited on screen

PagePlanner

Type Processor One

Bestinfo, Inc.
33 Chester Pike
Ridley Park, PA 19078
(215) 521-0757
List Price: \$4,995

Requires: IBM PC with 256K, two double-sided disk drives, Hercules Graphics Card, and RS-232 port (depending on output device).

CIRCLE 785 ON READER SERVICE CARD

PagePlanner

Westminster Software
660 Hansen Way, #2
Palo Alto, CA 94304
(800) 321-7300 (in Calif. 7298)
(415) 424-8300
List Price: \$1,995

Requires: IBM PC with 256K, two double-sided disk drives, Hercules Graphics Card, parallel port.

CIRCLE 786 ON READER SERVICE CARD

through a combination of cursor and function keys. Changes in type size, weight, or position are shown instantly, and you can make adjustments in 1-point increments (1 point being $\frac{1}{2}$ inch) in any direction. Even in small point sizes, the on-screen output is quite legible, and spacing on-screen fairly accurately reflects the hard copy version.

You can also zoom up or down to get an overview of a page format. Although *Type Processor One* offers a generous display (8 inches wide by 5.5 inches high), page depth on *Type Processor One* goes up only 20 inches. By zooming down the page size, you can see total depth and width on screen and edit the format as needed.

Trying On a Format

Using the form-fill mode, you can set up a page format not unlike that of the composition mode's. You might, for example, format a page to have three columns, a header with the article name, and a footer with publication date and page number. Then, using text from another word processing program, such as *WordStar* or *Xywrite*, you could pour your ASCII text files into the layout—hyphenated and justified—and save them to disk to be edited later in the composition mode or printed directly by the typesetter. Standard page formats that are saved on disk for routine layouts can be altered as needed for a particular job. Complicated layouts, such as wrapping text around photographs or illustrations, can be performed by unskilled typists in a few minutes.

Type Processor One also has some sophisticated typographic features.

These include automatic hyphenation for 20,000 words, with user intervention for words that can't be broken and automatic line justification (also with user intervention). The program shows hyphenation

Automatic kerning can also be activated with kerning pair tables to handle complicated letter- spacing logic.

and justification interactively on-screen in the real-time mode, and you can see instantly any changes in format. Automatic kerning can also be activated with kerning pair tables to handle complicated letter-spacing logic.

Typesetting parameters can be entered in the form-fill mode through the use of mnemonics codes (SZ for size, LS for line space, FT for types/fonts) prior to pouring in an ASCII text file. In the real-time mode the same kinds of parameters are displayed immediately on screen. Paragraph indents, space between paragraphs, or picture windows can be entered and previewed instantly. This ability is particularly valuable when you adjust spacing between letters for better typographic quality.

Bessin's approach was to combine all the elements of a front-end system—direct-entry, preview, and interactive editing—in a single software package.

Type Processor One can drive the Mergenthaler Linotron 202, Compugraphic 8200/8400, Itex's Quadritek series, and Penta/Qualex systems. Additional drivers are forthcoming, including one for the Canon laser printer.

At \$4,995, *Type Processor One* has many features found on dedicated systems costing \$20,000 or more, and the Form Fill mode makes it possible to use any PC or compatible as a text-entry terminal (including remote PCs through modems, local area networks, or disks by mail). *Type Processor One* is copy protected and must be booted from the A: drive, although typesetting files can be stored on hard disk.

PagePlanner

Ron Johnson, who was born in England, used his extensive experience writing front-end software for Linotype-Paul (the British division of Mergenthaler-Linotype) to develop *PagePlanner*. "It's not a complete front end," he pointed out, "but then it isn't intended for a large typesetting plant." Johnson has also started writing drivers for laser printers and sees *PagePlanner* as part of a desktop PC typesetting system.

PagePlanner is written in 16-bit assembler and runs under DOS 2.x. Like *Type Processor One*, *PagePlanner* supports two input modes, direct-entry and a form-fill mode. In the direct-entry mode, text can be typed from the keyboard or sent through a software bridge between *WordStar*, *MultiMate*, or *XyWrite* text files. Straight ASCII files must be rewritten with one of three word processors before they can enter into *PagePlanner*. *PagePlanner* files can be edited in

(Programs to Print By continued)

the direct-entry mode or after hyphenation and justification. *PagePlanner* has the standard block cut-and-paste and copy-and-move features and uses an intermediate disk save on files up to 40K (to prevent accidental deletion of a file).

Spacing Out

In addition to automatic hyphenation and justification, *PagePlanner* boasts multiple kerning-pair tables (you can enter 500 characters per table), a great feature for typographic spacing that can be predefined for various styles of types. Status lines keep you posted on size, line space, line-length, and column depth. Vertical and horizontal rules are inserted into predefined formats and adjusted prior to form-fill with the arrow keys. Adjustments can be made in 1-point increments vertically or horizontally.

The form-fill mode on *PagePlanner* differs from *Type Processor One's* in two respects: it doesn't support interactive editing, and text is represented by lines or blocks for previewing columnar, head, or foot spacing, or the placement of pictures. All editing takes place in the direct-entry modes, and you must reopen files to make corrections on them.

PagePlanner has drivers written for the Mergenthaler Linotron 202, Compugraphics 8200/8400, and the Itek Digitek series, with additional drivers planned for the Autologic APS-5, AM Varitypers, and several laser printers. Typesetting codes are sent through a standard parallel port.

Although it lacks the bells and whistles of *Type Processor One*, *PagePlanner* has more than enough power for many publishing situations, and at \$1,995 it is well within the reach of medium-size businesses that want to set in-house typesetting or send formatted files directly to a commercial typeset-

and the characters are legible even in small type sizes. Some typographers project a 50 percent savings in paper consumption, storage space, and waste-processing costs from using typeset formats in the office.

Laser printers and digital typesetting engines also have fewer moving parts and no printwheels to break or wear out. A wide variety of type styles can be stored on disk and loaded into the front-end software and the typesetting engine. And, although many laser printers currently offer only one or two on-line font styles, multiple-font capability is not far behind. The other major advantage is speed: laser printers and digital typesetters have rated printing speeds from 200 to 350 characters per second. Even a complex page format can be printed on plain paper in under 10 seconds.

PagePlanner and *Type Processor One* also offer two features that are usually expensive options on dedicated typesetters: on-screen preview and form-fill. The preview feature allows users with a minimum of typographic training to design and lay out pages. Columns, headlines, sub-heads, spaces for illustrations, and vertical and horizontal rules are shown as they will appear on the page, and layouts can be studied, changed, and previewed again before you commit them to paper. The form-fill feature lets you "pour" ASCII text into the page layouts. Using no complex coding and minimal intervention, you can create any shape on the page and fill it with text.

This kind of typographic power will be useful to many businesses. The most obvious customers are in-house typesetting departments. Corporate publications departments can add several typesetting terminals using PCs or compatibles they already have, and operate them without extensive training. The real-time formatting and editing capabilities make such software ideal for scientists and engineers who usually enter complicated equations manually. Output can be directed to digital phototypesetters for commercial printing or to laser printers for interoffice use.

Commercial graphic design firms will be able to justify the cost of in-house typesetting since the PC has an extensive library of DOS-compatible software for billing, list management, project manage-

The preview feature allows users with a minimum of typographic training to design and lay out pages.

ment, and word processing. Small publishers who produce newsletters or magazines will also be likely candidates to buy a PC-compatible typesetting system.

The implications for "work-at-home" typesetting are obvious. Whether working for one commercial shop or several, an operator retains complete control over a client's job until it's typeset. Whole pages can be sent by modem or on disk to typesetting plants anywhere in the country.

Irreconcilable Differences?

Part of the problem in implementing these new technologies is the typesetting industry itself. Unlike the PC and its compatibles, which share similar CPUs (8088 or 8086), operating systems, and disk format, the design of typesetting equipment is proprietary; sharing data between machines is not an option.

Most manufacturers, such as Autologic, Compugraphic, Mergenthaler, and Itek, develop both a typesetting unit (also called an engine) and a front-end system. The front-end system is similar to that of most computers, with a CPU, disk storage, and an input terminal. Although they all use standard ASCII code for alphanumeric, the systems are otherwise completely incompatible. The software, operating systems, and disk formats are all designed to lock you into the manufactur-

er's product line, particularly such supplies as specially formatted floppy disks.

Typesetting control codes assigned values above ASCII 128 are also "destandardized," and no two systems operate exactly the same way. Unlike printers, which use relatively simple control codes, typesetting units require complex control codes to handle size, spacing, justification, hyphenation, and kerning. This code is usually embedded in the document. Because each type style has its own character width table and justification logic, however, separate tables that process text as it is entered into the system must be first loaded into the front-end software. Both width tables and the document are sent to the typesetting unit when the document is set.

In the past, people have gotten around these difficulties by preparing standard ASCII text files on personal computers, then sending them to a typesetter's front end through a modem or by using direct file transfer between the two machines. Typesetting manufacturers added communications ports to their machines in the hope that such file transfer would address the needs of commercial typesetters who watched the microcomputer revolution pass by their dedicated systems.

ASCII file transfer solves only part of the problem. The file must be created on a PC, ported to a front end, then reformatted under typesetting logic to include such typesetting parameters as column width, type styles, sizes, line spacing, and page formats. This process, called "massaging" the text, left the typesetter in control of the final output. A few commercial typesetters offered to translate character strings into typesetting control codes. This process involved setting up a translation table on the typesetter that would take the character string "SIZE-9," for example, and translate it into code the typesetter's front end could understand. Translation tables had to be developed to accommodate various word processors and the typesetting equipment's own translation logic—not a simple task when you're dealing

with hundreds of different personal computers. In addition, the customer must understand typesetting terminology and the specific typesetting equipment being used.

Manufacturers recently started offering such standard operating systems as MS-DOS and CP/M-80 on their typesetters, with a bridge for swapping files to the typesetting front end. Although this move made their terminals less dedicated and

Soon, standalone typesetting equipment will become as common as the office copier.

allowed for ASCII file transfer, they still do not permit direct typographic control codes to be swapped into the system. Further, the MS-DOS and CP/M-80 used on these systems are not completely compatible; in many cases you'll need a special implementation of a popular program.

In almost every case, you must purchase both the typesetting unit and a front end to drive it, at considerable expense. Even with network boards and software that allow standard terminals to be linked to the typesetter, the front end still dominates system architecture.

Originally, *Type Processor One* and *PagePlanner* were designed to augment the market for in-house and commercial typesetters: large typesetting plants would sell high-volume type users a copy of *Type Processor One* and *PagePlanner* to set up files that could be returned and set on high-speed typesetters. This way commercial type shops would get more production from their equipment without the cost of extra (and dedicated) input terminals and operators. Because DOS allows for a large degree of portability among systems, almost any system can produce an ASCII file, which can then be typeset.

Typeset Memos

Recent developments in laser and ink jet printing, however, will soon bring the power of typography within the grasp of corporations. The implications go beyond commercial typesetting systems; IBM PCs and laser printers will eventually be used extensively to set high-quality type for day-to-day business communications. Soon, standalone typesetting equipment will become as common as the office copier.

This typesetting software poses a challenge to existing word processing technology. Currently, most word processing software supports only monospaced output in a few sizes. Although some programs offer true proportional spacing, they are usually limited to one or two type sizes. Multiple-column formats, headlines, subheads, captions, and footnotes are as difficult to code in software as they are in dedicated typesetting systems.

Even if the software can handle these complex tasks, the most common printing technologies—letter quality and dot matrix—further constrain the process. Impact printing has mechanical limits that will not be readily overcome. As laser printer prices go down, impact printing will be replaced in business and, eventually, the home. Compared to font programs for use with graphics printers, typesetting software on the IBM PC offers considerably better resolution, better output speeds, more portability between systems, and a wider range of applications, including laser printing, for which drivers are being written. Typography will soon be transformed from an art allied with printing to a separate communications medium in which software engineers create the tangible product. They will spawn what typographer Jan Tschichold described in his book *The New Typography* as "... objects, designed without reference to the aesthetics of the past. ..."

Tom Stanton is a writer for Digital Equipment Corporation.

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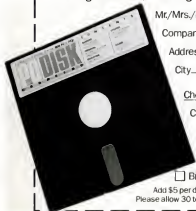
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Textual Healing With Script/PC

The same GML tags utilized by Script/VS now allow PC users to create professional-looking documents without spending a lot of time formatting.

IBM mainframe customers using TSO or VM 370 are already familiar with a text formatter called DCF (Document Composition Facility). Designed as an aid for composing large technical or business documents, DCF is also an excellent tool for creating memos, labels, and form letters.

Text is formatted through the use of a markup language called *Script/VS* and a set of defined macros (based on *Script/VS* control words) called Generalized Markup Language, or GML tags. As one of its Personal Computer Productivity Series, IBM has published a PC version of DCF/Script/VS called *Script/PC*. This package is a subset of *Script/VS*, which allows you to use GML tags to produce professional-looking documents on your PC. *Script/VS* control words are similar to the dot commands used in word processing programs like *WordStar*. For example, a .SP 3 com-

mand written at the beginning of a new line would be interpreted by DCF to mean skip three lines before printing the next line of text.

.SP 3 is a single control word. A GML tag, on the other hand, can do many things with one command. The :H1. header tag, for example, will start a new page, use only capital letters, underscore, type in boldface, put an entry into the table of contents, allow three spaces after the heading, and print a short title at the bottom of the page if specified.

As you can see, a GML macro tag gets a lot of mileage out of a single command. These powerful commands permit great speed and flexibility in creating text for the text formatter to translate into document form.

Unlike most conventional word processors, which combine text edit, format, and print into one process, *Script/PC* is part of

a specialized, two-step process.

Step one involves the creation of text with a text editor, and step two involves the use of the *Script/PC* text formatter to format and print the finished document. Separating the editing and formatting functions can optimize each process, and the result is usually superior to that of the single-step word processor. Consider a parallel example: It is possible to buy an amplifier and tuner in one integrated unit, but a purist will insist on separate components because a combination product may compromise quality. Most of us can't hear any difference, but the audio enthusiast refuses to take chances. In the same light, there are some excellent single-stage word processors on the market, but the majority of technical and business writers who have access to an IBM mainframe use the DCF two-step process for its flexibility and power.

(continued)

Helpful Assistance

Script/PC is attractively packaged in the IBM standard binder and contains exhaustive documentation of the *Script/PC* GML tags as well as how-to-program documentation. The text is logically arranged, and is split into three booklets: *How to Use Script/PC*, a *Quick Reference Guide*, and a *Reference Manual*.

Although the documentation is useful and is required reading for those unfamiliar with *Script/VS*, the program's help facility (accessed by hitting F1) is almost a tutorial in itself (see Figure 1).

An experienced DCF user, having browsed the various help screens, would no doubt be able to print a document without any problem.

Fast Files

If you have access to an IBM mainframe, *Script/PC* can format and print text created with *Script/VS*. For example, I created text files on an IBM mainframe using TSO and the SPIF editor and downloaded them to my PC using an ANR 3278/9 adapter and some custom software. (It would be possible to accomplish the same thing using the download facility on a 3270 PC.) Downloading the text files is preferable because, unless you have a dedicated printer near your office, using your desktop printer beats waiting for the Computer Center to sort and deliver your hard copy. This is perfect for those occasions when a presentation must be ready



Script/PC

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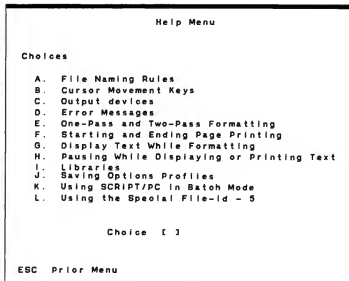


Figure 1: *Script/PC*'s help menu

for that afternoon's board meeting.

If a mainframe is not available, one of the best ways to create the text file is with IBM's *Professional Editor*. It's probably the best all-around text editor for the PC on the market, and you can use defined macros in SCT.PRF supplied by *Script/PC* in the edit process.

SCT.PRF is a file that contains 35 of the most commonly used GML tags and can be accessed easily from the *Professional Editor* by hitting F6. Any of the tags can be conveniently inserted into the text being edited by hitting Alt and the associated key. For example, to insert an :ADDRESS tag, you press Alt-A.

Script/PC also has a file of GML tags called PROFGML.TAG, containing all of the GML tags available in the starter set, which may be imported into the *Professional Editor* by hitting Alt-9. This may be an advantage to a new user creating a document; the tags not required are deleted.

Although the data in the SCT.PRF and PROFGML.TAG files can be a great help in creating text to be formatted with *Script/PC*, they are not designed for use with

non-IBM text editors. If you're a confirmed *WordStar* or *EasyWriter* addict, you can create a text file using your favorite word processor, but you should exercise some caution when doing this.

In *WordStar*, you must use the non-document option to ensure that the file is free of unnecessary format commands and control characters. I found that using any *WordStar* formatting aids resulted in missing characters and other unpredictable results. It is fairly easy to create a text file without format commands, but you won't be able to use the word-wrap feature.

Those of you who use *EasyWriter* can create text files in the usual manner, but since *EasyWriter* data are stored in compressed binary format, you must convert the file to ASCII format using the TRANSFER program that is provided as one of the DOS utilities on the *EasyWriter* program disk. This program translates the compressed binary text to ASCII and removes the *EasyWriter* format, control, and print commands, creating a clean ASCII file for *Script/PC* to use.

Oddly enough, while the *Script/PC*

program claims not to provide a text editor, there is a practice option on the main menu that can be used to format small documents. There is, of course, limited editing capability, and if you make a mistake on an input line after pressing the Enter key, there is no way to recover. This means that word wrap is not available, and you'll hear an annoying beep when you hit the end of a line. Since *Script/PC* takes your partial sentences and strings them together into coherent paragraphs, however, this drawback is minor. To create small, one-time documents (there is no save facility in the practice mode) or to just try out the package, you can use the practice facility.

Provided that the NOTABS option is used, the IBM *Personal Editor* can also be used to create documents, as can the DOS line editor, EDLIN, but only as a last resort.

Printing in Script

The *Script/PC* program and files can be copied. IBM suggests that DOS be loaded and the DATE and TIME options updated prior to starting the main program by typing SCRIPT. However, if your PC has an internal clock, I would suggest creating an AUTOEXEC.BAT file to load the program when booting.

You can operate *Script/PC* in either batch mode or interactive mode. The batch mode operates with "profiles", which contain parameters for printing and formatting your text files. You can use the default profiles that come with *Script/PC* or set up your own. To use the patch mode, you type SCRIPT, the name of the input file, and the name of the profile to be used (for example, SCRIPT B:TEST1.TXT A:PROFILE.SCP). The program immediately starts formatting and/or printing your document using the default profile or the option profile you've specified.

The second method is the menu-driven, interactive mode. When the program is booted from DOS, a main menu appears, with options to format a document, practice *Script* or GML, or return to DOS. At

this point, help is available by pressing the F1 key. The help screens are very informative.

If you choose the option to format a

document, *Script/PC* will display another menu showing the available print options (see Figure 2). The default options are already shown on the menu, and you



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SCRIPT/PC

decide whether or not to change the various parameters. Once the options are set as you want them, pressing the F10 key will start the formatter.

Featured Attractions

Error messages generated during the format process can be saved to a text file to be printed. This is a useful function if the user is unfamiliar with *Script* or regularly formats very large documents. I was able to use the on-screen messages to identify problems and found no use for a file of messages. The "two-pass" option, on the other hand, is extremely useful—it allows the automatic creation of tables of contents, lists of illustrations, or the use of set symbols. If you've ever struggled to put together a table of contents or an index, you'll see this feature as a great blessing. The process is initiated by one GML tag (provided in the GML-tag starter set supplied with the program) and uses the header levels to create nicely formatted index or table-of-contents pages. This macro will be a great help to anyone creating

technical or business documents.

Formatted text can be displayed optionally on the screen during formatting and will pause after each screen or page, if requested on the print profile, to permit proofreading. The print profiles may be saved and assigned to any text file by typing in the filename. Because the print options are limited, however, this is not a big timesaver.

Script/VS users are familiar with some of the powerful formatting options that are possible with this system. For instance, most word processors are restricted to one column of formatted text per page. *Script/PC* will format two columns for a more typeset appearance. Boxes can be used to highlight sections of the text, to design invoices and other forms, or simply to add a more polished look to your documents.

Unfortunately, the programmers neglected to take advantage of the IBM Graphic Printer's graphics capabilities with regard to the selection of fonts available. One of the first things I did was to set

FORMAT A DOCUMENT	
Format input file-id	[]
Options	
Output device	[P]
Disk output file-id	[]
Error message file-id	[]
Passes	
Page number - start	[1]
Page number - end	[999]
Display while formatting	[N]
Display screen pause	[N]
Printer pause	[N]
Macro library file-id	[GMLLIB]
Options profile file-id	[PROFILE]
F1 Help F2 Save Options F9 Main menu F10 Start Esc Quit	

Figure 2: *Script/PC*'s print options menu.

up my own file with custom tags for the headers. Defining a number of custom fonts (such as compressed print and double-width print) was also a must. These small touches make for a much more professional-looking document.

Getting Organized

Other documents and files can be embedded into the text by using the .IM control word. This is useful when assembling

Script/PC offers the option of declaring portions of your files conditional.

bling large documents that have several people working on different subjects or assigning lists of names and addresses to a form letter. I find it useful to break down a large document into subjects that I then work on individually. This saves the time spent searching for a topic embedded in one mountain of text and makes it simple to combine topics by using a driver file, which calls all the other text files that will be included in the final document. The driver file usually contains only the cover page and introductory pages plus a series of filenames that makes up the balance of the document. It's amazing how this approach can change a rambling collection of disjointed notes into well-organized text.

While *Script/VS* was not intended as a programming language, it contains options that allow for conditional processing and interactive editing. The .IF control word, when used in conjunction with a test parameter such as EQ (equal to) or GT (greater than) can be used to direct processing and decide whether the text should or should not be processed. Other control words allow for conditional selection using the traditional IF, THEN, ELSE, and OR logical operators. As you can

imagine, these features are extremely useful for editing text and making print decisions based on text variables or date/time parameters.

Among other goodies *Script/PC* offers is the option to declare portions of your file conditional. For example, a file may contain the text for several different form let-



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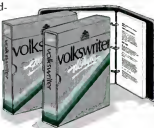
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SCRIPT/PC

ters, and instead of having to remember the names of a dozen files, you can select which portions of the text to process by using a control-word sequence. Although this process sounds a little complicated, it is actually easy to learn.

Script/PC vs Script/VS

You're probably wondering what differences there are between the mainframe DCF/Script/VS system and *Script/PC*. The answer is: not many. For instance, there are *Script/VS* control words and GML tags used in the mainframe offering that are not supported in *Script/PC*, but these probably wouldn't be missed by most users. Commonly used tags not supported by *Script/PC* are the :CE n option in the :CE center control word and the :HP0 highlight-

Most of the SPIF files I downloaded performed as advertised when processed by *Script/PC*.

phrase GML tag. These are not glaring omissions, however, and can be defined by the user if required, since the package permits user-defined control words, tags, and symbol macros.

Most of the SPIF files I downloaded performed as advertised when processed by *Script/PC*. The only one that didn't was a result of sloppy usage on my part; an .SP3 control word accepted in DCF requires .SP(blank)3 in *Script/PC*. While we're on the subject of sloppy usage, the :GDOC tag that starts a document is mandatory in *Script/PC*. Without it, the definitions for the highlights and various other symbols are not available to the program. (A symbol macro is just what it sounds like; a phrase starting with an ampersand (such as &PC) that is defined to represent a phrase, number, or mark-up control

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word. An example used by the program is the &SYSDATE symbol, which is used to insert the date in a text file.)

In addition to these minor *Script* differences, there are a number of useful functions in DCF that *Script/PC* doesn't have. There is no spelling checker; one is advised to use the spelling checker associated with your edit program. *Script/PC* includes a dictionary of tags which can be imported into the IBM *Word Proof* program, so the tags won't be recognized as spelling errors.

Other features that will be missed by DCF users are autonumbering of headers, binding options, and odd/even page formatting. Also, messages are not automatically printed at the end of the document (although they can be saved and printed out). Users will also miss the ability to specify the number of copies. (This function, it should be noted, is absent from most word processors.)

As Time Goes By

The biggest problem with *Script/PC* is speed, probably because it's written in compiled BASIC. For example, a 10-page document with a table of contents took over 15 minutes to format in two passes and then print on an Epson MX-80. Even if a print buffer is available, the format process is too time consuming. Waiting for a large document may try the patience of some users.

The automatically generated spacing after headers and between paragraphs is excessive. A normal 3-page document, as formatted by DCF, will be stretched to at least 4 or 5 pages depending on the number of tags in the text. This is a real paper waster and also detracts from the appearance of the text.

Fortunately, these defaults can be rectified by redefining the tags and creating your own header library or by reworking the HEADDEF.SCT file provided by the program. This task is made easier by the comprehensive documentation.

One quirk of the program I found more annoying than troublesome is its inability

to accept more than one line as a header. It will print the line (displaying an error on the screen) but cannot include it in the table of contents. Another flaw struck me

as more significant; when the program discovers a major error (e.g. for example, a stranded GML :EOL-list tag without a prior ordered list-start tag), it stops the for-

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CIRCLE 342 ON READER SERVICE CARD

mat process, identifies the problem, and then asks if you wish to continue. Even if you choose to continue, it will complete the format process and then crash and

hang up during the print process. Nothing can be done to convince the printer to continue. Wouldn't it be easy enough to ignore the errant control word and just

print the balance of the document?

You can specify start and stop page numbers, so that if an error is on only one page, only the one page need be reprinted. While IBM has some reservations about this feature, having issued an ominous warning message in the documentation to the effect that "if changes are extensive . . . partial printing of the document can

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CIRCLE 181 ON READER SERVICE CARD

The automatically generated spacing after headers and between paragraphs is excessive.

cause you to lose information," I was unable to find the problem described.

Script/PC is in keeping with the IBM tradition of quality packaged software. The program works as advertised, and if you can live with the slower speed, the omission of a few DCF functions, and the fact that some of the screens appear to be simplistic afterthoughts to all the functions designed into the program, it is possible to produce professional-looking documents on your PC without wasting excessive time formatting. The only hardware problem is that the package is designed for use with the IBM PC Graphics Printer or Matrix Printer, which means that no other popular printers can be used.

Those of you who use DCF and are already familiar with *Script/VS* will find *Script/PC* an acceptable implementation of the original mainframe product. Should you buy it? For *Script* users it's a must. After using it for a while you may wonder how you got along without it.

For non-users: If you're prepared to learn a few of the most commonly used tags, you will find it a new high in your search for the perfect word processor. My copies of *WordStar* and *EasyWriter* are on the shelf accumulating dust. ■

David E. Malone is a systems analyst at IBM Canada Ltd.

PC Notepad Made Easy

This short and sophisticated .COM file creates a window under all your programs to let you keep notes on the fly.

A persistent problem of mine has always been that good ideas always occur at the wrong moment. For instance, when I work on a program, the perfect solution to some other problem (any problem but the one on the screen) often occurs to me. When it happens, I have to either leave my editor and edit another file or scratch out my idea on a paper notepad. Like most people, I choose the pad. In fact, there is hardly a PC I know of in serious use without an accompanying pad of paper. Unfortunately, notes can accumulate, and I gradually find my desk littered with little mounds of neglected inspiration.

During one of my many desk-cleaning operations, it occurred to me that the PC is, after all, an information-handling machine, and it shouldn't require little scraps of paper to help it out.

One of the most popular new kinds of software is the type that lets you hit a key or two and suddenly see a window appear on your screen. By typing in and running the BASIC NPAD.BAS program in Figure 1, you will have a free program to do this for you. And, best of all, you can easily customize it to suit your tastes in colors and control keys.

After running NPAD.COM once—which attaches the program onto DOS—every time you type Ctrl-N a small notepad in reverse video appears in the upper



right-hand corner of the screen. Whatever you type next goes onto the pad. Typing Ctrl-N again turns the window off. The best part of NPAD.COM is that you can type Ctrl-N at any time—during an editor session, while a program is running, or while filling your spreadsheet. NPAD.COM will load your notes into memory and will redisplay them on the screen when you're in another program and ready for them.

This process removes the Ctrl-N key combination from general use, which may be unpopular with some users ("Not Ctrl-N! That's the best command key in my PurpleProse word processor. It's the one that sorts the paragraphs alphabetically!"). At the end of this article I'll provide directions for customizing NPAD.COM to use some other control character—there

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PROGRAMMING

just has to be an unpopular key somewhere on the keyboard.

To install NPAD.COM in your PC, type in and run the BASIC program NPAD.BAS, which will create the assembly language program NPAD.COM. When you run NPAD.COM (by typing NPAD while in DOS), the program will attach itself to DOS and give you a PC notepad to use until you reboot. Within NPAD.COM, carriage returns and backspaces work as you'd expect. The Del key erases the whole pad. If you use NPAD.COM while a program is running, you may be startled to see the PC apparently doing two things at once as your note appears on the screen. What allows the PC to do this is the interrupt mechanism, which is fundamental to NPAD.COM and the PC itself.

Interrupts

There are two types of interrupts, hardware and software, and NPAD.COM gives us an opportunity to discuss both. Every time you press a key, the keyboard sends a signal—a hardware interrupt signal—to the PC. Every time the PC exe-

cutes a machine language instruction, one of the things it does is check whether an interrupt was generated. If one was, the PC suspends its current job, first to find out where the interrupt came from and then to attend to it. In this way the PC doesn't constantly have to ask the keyboard whether you typed something. The keyboard (or the disk or the serial communications line, etc.) interrupts the PC; the PC doesn't interrupt the keyboard.

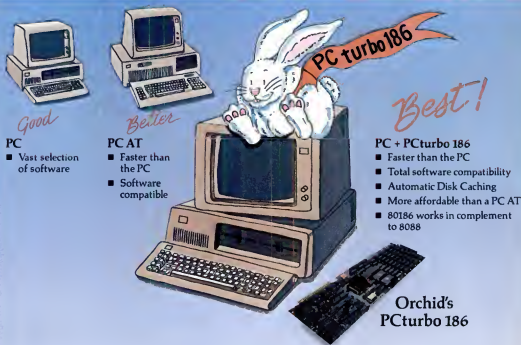
When the keyboard interrupts, the PC can disregard the signal if it is involved in something critical (which is why the Ctrl-C, Ctrl-Break, or Ctrl-Alt-Del combinations may not always work immediately), or it can jump to an interrupt service routine. The keyboard service routine is contained in ROM, and one thing it checks is whether you typed Ctrl-C, Ctrl-Break, or Ctrl-Alt-Del. To do this, the first thing it must do is decide just what you typed. The number it gets from the keyboard is, as you might expect, different for every key on the keyboard. This number is called the scan code: each key has a unique scan code. The keyboard service routine checks

```
100 ' NPAD.BAS -- by Steven Holzner -- created NPAD.COM notepad
110 '
120 TI=0:FOR N=1 TO 556:READ BX:TI=TI+BX:NEXT ' Verify DATA
130 IF TI=494831 THEN 140 ELSE PRINT "Check typing and redo!":END
140 RESTORE:OPEN "NPAD.COM" AS #1 LEN = 1 'Open Npad.com
150 PRINT "CREATING NPAD.COM"
160 FIELD #1,1 AS BYTE,B
170 FOR N=1 TO 556:READ BYTE,X
180 IF BYTE,X<256 THEN 220
190 LSET BYTE,B:=CHR$(32)
200 FOR I=1 TO BYTE,X:PUT #1:NEXT I
210 GOTO 240
220 LSET BYTE,B:=CHR$(BYTE,X)
230 PUT #1
240 NEXT N:CLOSE #1
250 PRINT "NPAD.COM CREATED."
270 END
280 DATA 233, 218, 3, 0, 0, 95, 499, 0
290 DATA 0, 0, 0, 0, 0, 112, 0, 0
300 DATA 0, 0, 0, 0, 0, 0, 0, 0
310 DATA 80, 83, 81, 82, 87, 86, 30, 6
320 DATA 156, 46, 255, 30, 6, 3, 187, 64
330 DATA 0, 142, 219, 139, 30, 28, 0, 59
340 DATA 30, 26, 0, 116, 60, 131, 235, 2
350 DATA 131, 251, 30, 115, 3, 187, 62, 0
360 DATA 139, 23, 129, 250, 14, 49, 117, 68
370 DATA 137, 30, 28, 0, 46, 247, 22, 3
380 DATA 1, 46, 131, 62, 3, 1, 0, 117
390 DATA 27, 46, 190, 6, 255, 2, 7, 46
400 DATA 199, 6, 251, 2, 250, 0, 141, 6
```

(Figure 1 continues)

Figure 1: The BASIC NPAD.BAS program to create NPAD.COM.

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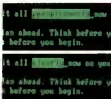
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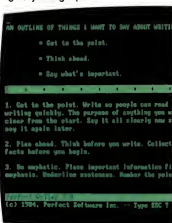
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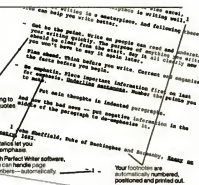
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CIRCLE 408 ON READER SERVICE CARD

PROGRAMMING

(continued)

```

410 DATA 132, 4, 46, 163, 2, 3, 232, 72
420 DATA 1, 233, 198, 0, 46, 199, 6, 251
430 DATA 2, 250, 0, 141, 6, 93, 4, 46
440 DATA 163, 2, 3, 232, 31, 1, 232, 146
450 DATA 0, 233, 134, 0, 46, 247, 6, 3
460 DATA 1, 1, 0, 116, 220, 137, 30, 20
470 DATA 0, 129, 250, 0, 83, 117, 31, 187
480 DATA 249, 0, 46, 198, 135, 5, 1, 32
490 DATA 75, 117, 247, 46, 198, 6, 5, 1
500 DATA 95, 46, 199, 6, 249, 2, 0, 0
510 DATA 232, 96, 0, 235, 63, 144, 129, 290
520 DATA 8, 14, 117, 33, 46, 139, 30, 249
530 DATA 2, 131, 251, 0, 126, 17, 46, 190
540 DATA 135, 5, 1, 32, 46, 198, 135, 4
550 DATA 1, 95, 46, 235, 14, 249, 2, 232
560 DATA 57, 0, 235, 46, 144, 129, 236, 13
570 DATA 28, 117, 9, 232, 72, 0, 232, 42
580 DATA 0, 235, 31, 144, 46, 139, 30, 249
590 DATA 2, 129, 251, 249, 6, 125, 16, 46
600 DATA 136, 151, 3, 1, 46, 198, 135, 5
610 DATA 1, 95, 46, 235, 6, 249, 2, 232
620 DATA 9, 0, 7, 31, 94, 95, 90, 89
630 DATA 91, 88, 207, 68, 46, 198, 6, 255
640 DATA 2, 112, 46, 199, 6, 251, 2, 0
650 DATA 0, 141, 6, 132, 4, 46, 163, 2
660 DATA 3, 232, 133, 0, 80, 195, 46, 129
670 DATA 62, 249, 2, 225, 0, 125, 43, 46
680 DATA 139, 38, 249, 2, 139, 195, 61, 24
690 DATA 8, 116, 28, 124, 5, 43, 25, 0
700 DATA 235, 244, 46, 198, 135, 5, 1, 32
710 DATA 46, 255, 6, 249, 2, 235, 224, 46
720 DATA 198, 135, 6, 1, 95, 46, 255, 6
730 DATA 249, 2, 195, 82, 190, 2, 0, 46
740 DATA 139, 22, 4, 3, 236, 168, 1, 117
750 DATA 251, 236, 160, 1, 116, 251, 38, 130
760 DATA 37, 71, 78, 131, 254, 0, 116, 7
770 DATA 46, 136, 167, 5, 1, 235, 229, 67
780 DATA 98, 195, 82, 46, 138, 167, 5, 1
790 DATA 198, 2, 0, 46, 139, 22, 4, 3
800 DATA 226, 168, 1, 117, 251, 236, 168, 1
810 DATA 116, 251, 38, 136, 37, 46, 130, 30
820 DATA 253, 2, 71, 78, 117, 234, 67, 90
830 DATA 195, 187, 8, 176, 142, 195, 46, 139
840 DATA 62, 8, 3, 46, 3, 62, 253, 2
850 DATA 46, 139, 30, 251, 2, 105, 16, 0
860 DATA 186, 23, 0, 46, 235, 22, 2, 3
870 DATA 74, 117, 248, 46, 3, 62, 253, 2
880 DATA 226, 236, 195, 184, 6, 0, 142, 216
890 DATA 161, 36, 0, 46, 163, 6, 3, 161
900 DATA 38, 0, 46, 163, 8, 3, 199, 6
910 DATA 36, 8, 18, 3, 148, 14, 30, 0
920 DATA 180, 15, 203, 16, 128, 236, 25, 200
930 DATA 220, 46, 136, 38, 253, 2, 46, 199
940 DATA 6, 4, 3, 186, 3, 168, 4, 117
950 DATA 14, 46, 199, 6, 0, 3, 0, 120
960 DATA 46, 199, 6, 4, 3, 210, 3, 186
970 DATA 213, 4, 285, 39
    
```

(Figure 1 ends)

to see if the key has a corresponding ASCII code (function keys, for example, do not) and then puts the scan code and the ASCII code into the keyboard buffer (function keys get an ASCII code of 0).

The Keyboard Buffer

The keyboard buffer is a set of 16 memory words. One of these, a location called the "head," marks the next character to be read from the buffer, and the

"tail" is where the next character is to be written into the buffer. If you type a character, the tail advances. When you read one, the head does.

Since both the head and the tail wrap around when they come to the end of the buffer, it is most profitably thought of as a ring of 16 words, which presents the wryly humorous picture of the head forever chasing the tail. When the head catches the tail and the two are at the same position, the

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PROGRAMMING

buffer is empty. If the tail comes from behind and overlaps the head an error is generated (and you get that ridiculous beep), since the next character will be written where the tail is, and that is pointing to an unread character.

What NPAD.COM Does

NPAD.COM works by intercepting the keyboard interrupt service routine after it has put the scan code and the ASCII code into the buffer. The first thing it does is to check whether the character was a Ctrl-N. If so, NPAD.COM turns the screen on if it was off (or off if it was on) and then simply erases the Ctrl-N by moving the tail back one space. As far as the program you are running is concerned, it's as if no character were typed at all.

If the character typed wasn't a Ctrl-N and the pad is off, NPAD.COM doesn't interfere. If the pad is on, though, NPAD.COM erases the character from the buffer and checks to see if you typed one of three special characters: Del (which erases the pad), carriage return, or Backspace. If not, it presumes that you want to display the character on the pad and stores its ASCII code in memory. Since there are no restrictions on which keys you push, you can see some of the characters the PC can display that you may not have seen before. The Ctrl-A key combination, for instance, will display ASCII code 1; Ctrl-B, ASCII code 2 (these are the famous smiley faces), and so on up to Ctrl-Z.

Getting It On-Screen

Putting the display on the screen is where software interrupts normally shine. When you press a key and generate a hardware interrupt, you tell the PC to stop your program and execute one of its own internal routines. A software interrupt is much the same, except that your program itself tells the PC to stop and execute one of its internal programs. This makes it easy to use the huge BIOS routines that actually put a character on the screen rather than having to write the whole ponderous display instruction for yourself. To display a

character from most assembly language programs, all you really have to do is store your character and then call one of the interrupts with an INT instruction.

Unfortunately, that's not good enough for NPAD.COM. The problem is that NPAD.COM is designed to work at the same time as your program. Imagine what would happen if the program you were running were deep inside the interrupt routine for putting a character on the screen when you started using NPAD.COM. If NPAD.COM were to suspend your program's operation and then start using the same interrupt routine, all the variables being used by the program would get scrambled. When NPAD.COM was through, control would return to the original program, which would find its interrupted process in a shambles. As far as NPAD.COM is concerned, the price of simultaneity is programming simplicity. Instead of using the BIOS routines, you just have to put the characters on the screen yourself.

Buffer Magic

There is another important buffer in memory called the screen buffer. What makes the screen buffer an unusual section of memory is that both the 8088 and the screen controller have direct access to it. This means that to keep the screen updated the screen controller is constantly scanning this section of memory. Each space in it corresponds to one character on the screen. If we change one of the characters in memory, the matching character on the screen changes.

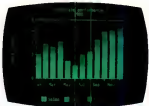
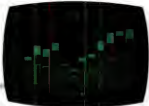
All this sounds as though it fits the problem like a glove, and it does—except that if you change a character in this area, you might break the smooth scanning action of the screen controller when you temporarily block its access to this part of memory. The outcome of such a blockage is a screen filled with sparkles, and while you may enjoy sparkles, it's not good public relations for any program.

The first thing to do with a problem like this is to consult the *Technical Reference*

IBM MONOCHROME GRAPHICS. NO COMPROMISE.



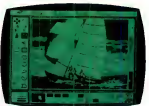
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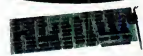
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PROGRAMMING

manual, an unparalleled compendium of information (but sadly not a model of clarity). In this case the solution is to check what the screen controller is doing before

you do anything. If you wait until it is doing a horizontal rescan of a line on the screen it has everything it needs from memory for a brief period and so you can

slip in a character harmlessly. This is, of course, what NPAD.COM does.

Customizing

NPAD.COM switches the pad on by checking whether you have typed a Ctrl-N. To do that, it has to store the ASCII code and scan code for Ctrl-N (14 and 49 respectively) in its program. If you change these two numbers you can use any char-

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CIRCLE 210 ON READER SERVICE CARD

NPAD.COM

switches the pad on by checking whether you have typed a Ctrl-N. To do that, it has to store the ASCII code and scan code for Ctrl-N.

acter you want to trigger the action of the program.

Consider a few options for other control characters. For the letters in the top (qwerty) row, the scan codes are: 16 (q), 17 (w), 18 (e), 19 (r), . . . , to 25 (p). For the next row it continues with 30 (a), 31 (s), 32 (d), . . . , to 38 (l). The bottom row is 44 (z), 45 (x), . . . , to 50 (m). If you have a *Technical Reference* manual, you'll find all the scan codes listed. There is also a handy section on scan codes in Appendix E of some of the more recent BASIC manuals. The ASCII code is easier to find because it's alphabetical. For Ctrl-A the ASCII code is simply 1, for Ctrl-B, 2, and so on to Ctrl-Z, ASCII code 26. Thus, the two numbers we would need if we wanted to use Ctrl-A to toggle the screen window are 1 (ASCII code) and 30 (scan code). For Ctrl-B they are 2 and 48, all the way to Ctrl-Z, which is 26 44.

Another possibility is to use one of the function keys: F1 is 00 (ASCII) 59 (scan),

PROGRAMMING

```

INTERRUPTS      SEGMENT AT 0H      ;This is where the keyboard interrupt
ORG             9H*4               ;holds the address of its service routine
KEYBOARD_INT    LABEL    DWORD
INTERRUPTS      ENDS

SCREEN          SEGMENT AT 0B000H   ;A dummy segment to use as the
SCREEN          ENDS               ;Extra Segment

ROM_BIOS_DATA   SEGMENT AT 40H      ;BIOS statuses held here, also keyboard buffer

                ORG     1AH
                HEAD DW   ?          ;Unread chars go from Head to Tail
                TAIL DW   ?
                BUFFER DW    16 DUP (?) ;The buffer itself
                BUFFER_END LABEL WORD

ROM_BIOS_DATA   ENDS

CODE_SEG        SEGMENT
ASSUME          CS:CODE_SEG
ORG            100H                ;ORG = 100H to make this into a .COM file
FIRST: JMP      LOAD_PAD           ;First time through jump to initialize routine

CTRL_N_FLAG    DW    0             ;Ctrl-N on or off
PAD            DB    '_,499 DUP(' ') ;Memory storage for pad
PAD_CURSOR     DW    0             ;Current position in pad
PAD_OFFSET     DW    0             ;Chooses 1st 250 bytes or 2nd
FIRST_POSITION DW    ?             ;Position of 1st char on screen
ATTRIBUTE      DB    112           ;Pad Attribute -- reverse video
SCREEN_SEG_OFFSET DW    0          ;0 for mono, 8000H for graphics
IO_CHAR        DW    ?             ;Holds addr of Put or Get_Char
STATUS_PORT    DW    ?             ;Video controller status port
OLD_KEYBOARD_INT DD    ?           ;Location of old kbd interrupt

N_PAD          PROC    NEAR         ;The keyboard interrupt will now come here.
ASSUME          CS:CODE_SEG
PUSH            AX                  ;Save the used registers for good form
PUSH            BX
PUSH            CX
PUSH            DX
PUSH            DI
PUSH            SI
PUSH            DS
PUSH            ES
PUSHF
CALL            OLD_KEYBOARD_INT    ;First, call old keyboard interrupt

ASSUME          DS:ROM_BIOS_DATA    ;Examine the char just put in
MOV             BX,ROM_BIOS_DATA
MOV             DS,BX

```

(Figure 2 continues)

Figure 2: Assembler code for NPAD.COM.

F2 is 00 60, . . . , to F10, 00 68. If you press any of these keys, you'll get the ASCII zero on the pad, which is displayed as a space. You might even want to use (in desperation) 127 14, Ctrl-Backspace.

If you look in the BASIC listing at the DATA statement in line 360 in Figure 1, you'll see the fifth number is 14 (ASCII code for Ctrl-N) and the sixth is 49 (the scan code for N). That's the Ctrl-N, so

replace the 14 49 with the ASCII and scan codes you prefer.

The complete assembly language source for NPAD.COM is shown in Figure 2. Just a few warnings are in order

PROGRAMMING

```

MOV     BX, TAIL                ;Point to current tail
CMP     BX, HEAD                ;If at head, kbd int has deleted char
JE      IN                      ;So leave
SUB     BX, 2                   ;Point to just read in character
CMP     BX, OFFSET BUFFER       ;Did we undershoot buffer?
JAE     NO_WRAP                 ;Nope
MOV     BX, OFFSET BUFFER_END   ;Yes -- move to buffer top
NO_WRAP: MOV DX, [BX]           ;Char in DX now
CMP     DX, 310EH               ;Is the char a Cntrl-N?
JNE     NOT_CNTRL_N            ;No
MOV     TAIL, BX                ;Yes -- delete it from buffer
NOT     CNTRL_N_FLAG            ;Switch Modes
CMP     CNTRL_N_FLAG, 0         ;Cntrl-N off?
JNE     CNTRL_N_ON             ;No, only other choice is on

CNTRL_N_OFF:
MOV     ATTRIBUTE, 7           ;Set up for normal video
MOV     PAD_OFFSET, 250        ;Point to 2nd half of pad
LEA     AX, PUT_CHAR           ;Make IO call Put_Char as it scans
MOV     IO_CHAR, AX            ;over all locations in pad on screen
CALL    IO                     ;Restore screen
IN:     JMP     OUT             ;Done

CNTRL_N_ON:
MOV     PAD_OFFSET, 250        ;Point to screen stroage part of pad
LEA     AX, GET_CHAR           ;Make IO use Get_char so current screen
MOV     IO_CHAR, AX            ;is stored
CALL    IO                     ;Store Screen
CALL    DISPLAY                ;And put up the pad
JMP     OUT                     ;Done here.

NOT_CNTRL_N:
TEST    CNTRL_N_FLAG, 1        ;Is Cntrl-N on?
JZ      IN                     ;No -- leave
MOV     TAIL, BX               ;Yes, delete this char from buffer
CMP     DX, 5300H              ;Decide what to do -- is it a Delete?
JNE     RUBOUT_TEST            ;No -- try Rubout
MOV     BX, 249                ;Yes -- fill pad with spaces

DEL_LOOP:
MOV     PAD[BX], ' '           ;Move space to current pad position
DEC     BX                     ;and go back one
JNZ     DEL_LOOP               ;until done.
MOV     PAD, ' '               ;Put the cursor at the beginning
MOV     PAD_CURSOR, 0          ;And start cursor over
CMP     BX, 0                  ;Are we at beginning?
JLE     NEVER_MIND             ;Yes -- can't rubout past beginning
MOV     PAD[BX], ' '           ;No -- move space to current position
MOV     PAD[BX-1], ' '         ;And move cursor back one
DEC     PAD_CURSOR             ;Set the pad location straight

NEVER_MIND:
CALL    DISPLAY                ;And put the result on the screen
JMP     OUT                     ;Done here.

CRLF_TEST:
CMP     DX, 1C0DH              ;Is it a carriage return-line feed?
JNE     CHAR_TEST              ;No -- put it in the pad

```

(Figure 2 continues)

before closing. If you reboot your PC, you won't lose a pad of paper full of notes, but you will lose the contents of NPAD.COM. Don't use it if you think you're going to crash frequently. Also,

you shouldn't use it if you've filled the type-ahead buffer and several keystrokes are still pending (that is, not yet read by your program or displayed on the screen). Furthermore, a few programs (XyWrite is

one) commandeer the keyboard interrupts themselves, and so cannot be used with NPAD.COM. Finally, it takes a while to get used to NPAD.COM but stick with it. You may ultimately find yourself reaching

PROGRAMMING

```

CALL    DISPLAY    ;Put up the new pad on screen
JMP     OUT        ;And take our leave

RUBOUT_TEST:
CMP     DX, 0E00H   ;Is it a Rubout?
JNE     CRLF_TEST  ;No -- try carriage return-line feed
MOV     BX, PAD_CURSOR ;Yes -- get current pad location
CALL    CRLF       ;Yes -- move to next line
CALL    DISPLAY    ;And display result on screen
JMP     OUT        ;Done.

CHAR_TEST:
MOV     BX, PAD_CURSOR ;Get current pad location
CMP     BX, 249     ;Are we past the end of the pad?
JGE     PAST_END    ;Yes -- throw away char
MOV     PAD[BX], DL ;No -- move ASCII code into pad
MOV     PAD[BX+1], '_' ;Advance cursor
INC     PAD_CURSOR  ;Increment pad location
PAST_END:
CALL    DISPLAY    ;Put result on screen

OUT:    POP     ES   ;Having done Pushes, here are the Pops
        POP     DS
        POP     SI
        POP     DI
        POP     DX
        POP     CX
        POP     BX
        POP     AX

N_PAD   IRET       ;An interrupt needs an IRET
        ENDP

DISPLAY PROC NEAR ;Puts the whole pad on the screen
PUSH    AX
MOV     ATTRIBUTE, 112 ;Use reverse video
MOV     PAD_OFFSET, 0 ;Use 1st 250 bytes of pad memory
LEA     AX, PUT_CHAR ;Make IO use Put-Char so it does
MOV     IO_CHAR, AX
CALL    IO         ;Put result on screen
POP     AX
RET     ;Leave
DISPLAY ENDP

CRLF    PROC NEAR ;This handles carriage returns
CMP     PAD_CURSOR, 225 ;Are we on last line?
JGE     DONE       ;Yes, can't do a carriage return, exit

NEXT_CHAR:
MOV     BX, PAD_CURSOR ;Get pad location
MOV     AX, BX         ;Get another copy for destructive tests

EDGE_TEST:
CMP     AX, 24        ;Are we at the edge of the pad display?
JE      AT_EDGE       ;Yes -- fill pad with new cursor
JL      ADD_SPACE     ;No -- Advance another space
        ADD     PAD_CURSOR, 1

```

(Figure 2 continues)

for Ctrl-N as often as you used to reach for a pencil.

(Editor's note: Although this program was designed to run on both color and mono systems, the color selection was designed

for a mono monitor. Since we use color almost exclusively at PC, we changed the program slightly to work in color. To do this yourself, you'll need to alter the bytes that control the color of the window and

the color to which the program resets the screen when the window disappears.

For the window colors, change the 112 in lines 290 and 640. The 112 is the decimal representation of 70H—the 7 in 70

PROGRAMMING

```

SUB    AX,25                ;Subtract another line-width
JMP    EDGE_TEST           ;Check if at edge now

ADD_SPACE:
MOV     PAD[BX], ' '        ;Add a space
INC     PAD_CURSOR         ;Update pad location
JMP     NEXT_CHAR          ;Check if at edge now

AT_EDGE:
MOV     PAD[BX+1], ' '      ;Put cursor in next location
INC     PAD_CURSOR         ;Update pad location to new cursor
DONE:   RET                ;And out.
CRLF    ENDP

GET_CHAR PROC NEAR        ;Gets a char from screen and advances position
PUSH    DX
MOV     SI,2               ;Loop twice, once for char, once for attribute
MOV     DX,STATUS_PORT    ;Get ready to read video controller status
G_WAIT_LOW:
IN      AL,DX              ;Start waiting for a new horizontal scan -
TEST    AL,1              ;Make sure the video controller scan status
JNZ     G_WAIT_LOW        ;is low

G_WAIT_HIGH:
IN      AL,DX              ;After port has gone low, it must go high
TEST    AL,1              ;before it is safe to read directly from
JZ      G_WAIT_HIGH       ;the screen buffer in memory

MOV     AH,ES:[DI]         ;Do the move from the screen, one byte at a time
INC     DI                ;Move to next screen location
DEC     SI                ;Decrement loop counter
CMP     SI,0              ;Are we done?
JE      LEAVE              ;Yes
MOV     PAD[BX],AH         ;No -- put char we got into the pad
JMP     G_WAIT_LOW        ;Do it again
LEAVE:  INC BX             ;Update pad location
POP     DX
RET

GET_CHAR ENDP

PUT_CHAR PROC NEAR        ;Puts one char on screen and advances position
PUSH    DX
MOV     AH,PAD[BX]         ;Get the char to be put onto the screen
MOV     SI,2               ;Loop twice, once for char, once for attribute
MOV     DX,STATUS_PORT    ;Get ready to read video controller status
P_WAIT_LOW:
IN      AL,DX              ;Start waiting for a new horizontal scan -
TEST    AL,1              ;Make sure the video controller scan status
JNZ     P_WAIT_LOW        ;is low

P_WAIT_HIGH:
IN      AL,DX              ;After port has gone low, it must go high
TEST    AL,1              ;before it is safe to write directly to
JZ      P_WAIT_HIGH       ;the screen buffer in memory

MOV     ES:[DI],AH         ;Move to screen, one byte at a time
MOV     AH,ATTRIBUTE       ;Load attribute byte for second pass
INC     DI                ;Point to next screen position
DEC     SI                ;Decrement loop counter
JNZ     P_WAIT_LOW        ;If not zero, do it one more time
INC     BX                ;Point to next char in pad
POP     DX
RET

PUT_CHAR ENDP

```

(Figure 2 continues)

PROGRAMMING

```

IO      PROC    NEAR      ;This scans over all screen positions of the pad
        ASSUME ES:SCREEN ;Use screen as extra segment
        MOV     BX,SCREEN
        MOV     ES,BX
        MOV     DI,SCREEN_SEG_OFFSET ;DI will be pointer to screen position
        ADD     DI,FIRST_POSITION ;Add width of screen minus pad width
        MOV     BX,PAD_OFFSET ;BX will be pad location pointer

        MOV     CX,10 ;There will be 10 lines
LINE_LOOP:
        MOV     DX,25 ;And 25 spaces across
CHAR_LOOP:
        CALL    ID_CHAR ;Call Put-Char or Get-Char
        DEC     DX ;Decrement character loop counter
        JNZ     CHAR_LOOP ;If not zero, scan over next character
        ADD     DI,FIRST_POSITION ;Add width of screen minus pad width
        LOOP    LINE_LOOP ;And now go back to do next line
        RET     ;Finished
IO      ENDP

LOAD_PAD PROC    NEAR ;This procedure initializes everything
        ASSUME DS:INTERRUPTS ;The data segment will be the Interrupt area
        MOV     AX,INTERRUPTS
        MOV     DS,AX

        MOV     AX,KEYBOARD_INT ;Get the old interrupt service routine
        MOV     OLD_KEYBOARD_INT,AX ;address and put it into our location
        MOV     AX,KEYBOARD_INT(2) ;OLD_KEYBOARD_INT so we can call it.
        MOV     OLD_KEYBOARD_INT(2),AX

        MOV     KEYBOARD_INT,OFFSET N_PAD ;Now load the address of our notepad
        MOV     KEYBOARD_INT(2),CS ;routine into the keyboard interrupt

        MOV     AH,15 ;Ask for service 15 of INT 10H
        INT     10H ;This tells us how display is set up
        SUB     AH,25 ;Move to twenty places before edge
        SHL     AH,1 ;Mult by two (char & attribute bytes)
        MOV     BYTE PTR FIRST_POSITION,AH ;Set screen cursor
        MOV     STATUS_PORT,03BAH ;Assume this is a monochrome display
        TEST    AL,4 ;Is it?
        JNZ     EXIT ;Yes - jump out
        MOV     SCREEN_SEG_OFFSET,0000H ;No - set up for graphics display
        MOV     STATUS_PORT,03DAH

EXIT:    MOV     DX,OFFSET LOAD_PAD ;Set up everything but LOAD_PAD to
        INT     27H ;stay and attach itself to DOS
LOAD_PAD INT     27H
        ENDP

CODE_SEG ENDS

END      FIRST ;END "FIRST" so 0000 will go to FIRST first.

```

(Figure 2 ends)

yields a white (green in mono) background and the 0 yields black characters. (This is the code for monochrome reverse video text.) If you want red letters on a white background, change the 112 to 116

(116 is the decimal form of 74H). If you want dark blue letters on a light blue (cyan) background, change the 112 to 49 (49 is the decimal form of 31H).

For the reset color, change the 07 in

line 390. Since we work largely in dark blue characters on a white background, change the 07 to 113 (the decimal form of 71H). For white letters on a dark blue background (the way editor Bill Machrone

PROGRAMMING

likes his screen) change the 07 to 23 (the decimal form of 17H).

As for the best key combination to activate and deactivate NPAD.COM, while

Ctrl-N is easy to remember, since N is the first letter of Notepad and NPAD, too many programs already use Ctrl-N. The best trigger key, in my opinion, is the grave

accent (the reverse apostrophe on the same key as the tilde on the PC keyboard). This is almost never used by anything, and it should be conveniently located right next to the Enter key. To have this key trigger the window, just change two numbers in line 360: the 14 becomes a 96 and the 49 becomes a 41.

Final Reminder

Remember two very important things—the number 49483! in line 130 of Figure 1 is a checksum of all the DATA statements. If you change the colors or the Ctrl-N trigger key, you must make corresponding

The best trigger for NPAD.COM is the grave accent. This is almost never used for anything and is right next to the Enter key.

changes in this total as well. In other words, if you change the pair of 112s in lines 290 and 640 to 116s, you'll have to add another 8 (4 + 4) to 49483! to yield 49491!. All other changes must change this checksum accordingly.

If you like, you can also make all your changes easily with DEBUG. The two window colors are at locations 2FFH and 413H (you should find original values of 70 here if you give DEBUG the command -E 2ff and -E 413). The reset color is at location 350H (original value of 07). And the trigger (the key that activates and deactivates the window) is at locations 336H and 337H (the original values here are 0E and 31).

Note too that if you do make a change, you'll have to create a new NPAD.COM file and reboot to make the new changes effective—you can't just run a new NPAD over an old one.—P.S.

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CIRCLE 303 ON READER SERVICE CARD

Classical Hits

El-Ixir and Pits & Stones garner above-average ratings for exercising the brain, especially El-Ixir, which serenades you with an exotic Russian refrain if you "embrace" your opponent.

This quiet game of strategy stirs my blood. You see, I'm of your basic, oversentimental Russian stock. Give me a Rimsky-Korsakov score and a bottle of schnapps, and I'm all set to sit misty-eyed in front of my IBM PC for hours. They did, and I did, and I liked it.

El-Ixir is quite a nice piece of work, from its stunning packaging and intelligently written manual to its attractive on-screen displays and clever sound effects and computer music. This game combines chesslike strategy with computer-arbitrated randomness. Although it's designed to be played between two opponents, I also found it challenging to play both hands. If you like *Othello*, *Reversi*, chess, checkers, or any of the many strategy board games of antiquity or modernity, you should enjoy this product.



El-Ixir

ISOFT

P.O. Box 10762
Stanford, CA 94305
(415) 857-9684

List price: \$29.95

Requires: 64K RAM, color/graphics adapter, color or monochrome monitor.

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Each move—you can, and should, elect to play against the computer clock—starts when the computer flashes four randomly selected choices of squares. The computer allows you a few seconds to select the square you want, and then you tap the space bar when the one you want is highlighted. Next, after you choose a direction of up, down, left, or right, the computer randomly gives you from one to four squares in that direction. The gray screen fills in the



The snakes, chains, and anchors of mystical *El-Ixir*.

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squares you've captured with your battle colors after each move.

Strategic Opportunities

Although your moves are randomly determined, there is quite an opportunity to apply strategy as you seek to capture squares and block your opponent. Moreover, it's possible to win most of the battles and lose the war if you overlook an opponent's dividing-and-conquering chain. For example, in one of my games, I piddled around the corners all through the session and then made one brilliant connecting move, stealing all but one of my opponent's squares, to win by a score of 156 to 1. You should have been there.

A chain of connected squares defines your territory; when a chain touches a corner *El-Ixir* square, you earn a point for each link in the chain. The next level up the scoring ladder is an embrace, which results when you surround a piece of territory. If the embrace surrounds your opponent's territory, a fanfare sounds and you take over that property.

The Anchored Embrace

But for the big prize, and the key to the Sultan's treasure, you must construct an "anchored embrace"—a chain surrounding a piece of territory with one of its legs also connected to one of the *El-Ixir* corner squares. Do so, and as your points tally, listen to the refrain from Nikolai Rimsky-Korsakov's "Scheherazade."

And while I'm giving credit where credit is due, kudos to *El-Ixir* author Saied B. Nesbat, an electrical engineer and game-writing hobbyist, and to the artists and writers behind the record-albumlike package. The *El-Ixir* cover presents a futuristic boards-eye view, which is similar to a scene from the movie *Tron*, and the manual simply and intelligently explains the game.

I can't find any significant fault with this gentle piece of work—it can be adapted to run on a monochrome board; there is an option to select a 40-column

display for use with a television set; the music can be (gasp!) shut off; you can elect to play with or without the timer; and I was unable to crash the game.

A nice feature is *El-Ixir*'s timer option, which limits the time available to make a move and is shown as a shrinking color bar at the top of the game board. The user can also turn the timer off completely or ask the computer to allow a total of 400 cumulative time units—a nice way to learn to play the game without undue pressure.

El-Ixir exercises your brain and not your wrists.

On *PC Magazine*'s scale from a low of 0 to a high of 6, *El-Ixir* is a magical mystery tour:

FUN:	4.0
CHALLENGE:	5.0
SOUND/GRAPHICS:	6.0
TOTAL:	15.0



Pits & Stones

Orion Software

P.O. Box 2488

Auburn, AL 36831

(800) 821-8088

List price: \$36.95

Requirements: 128K RAM for DOS 1.1, 192K RAM for DOS 2.x, monochrome or color/graphics display and adapter.

CIRCLE 698 ON READER SERVICE CARD

Pits & Stones, an adaptation of an ancient strategy game played by many different civilizations in different parts of the world, has evolved from the pits and stones of North Africa to the bits and bytes of today's computers. As a child, I remember playing a similar game with sticks in the dirt. Orion's IBM PC version is capably translated and offers worthy exercise for the mind.

The screen displays 12 pits and a home base for each of two players. You can choose to play against a human opponent or against the tough computer. The game can be played either on a monochrome display in the office or with full color on

PC ARCADE

a monitor driven by the PC's color/graphics card. There are six levels of difficulty and a number of other user-selectable options, such as one to turn the music on or off. The game also provides a self-running demonstration program and a full set of on-screen help prompts available at any time.

A Brutal Game

The simple object of *Pits & Stones* is to collect as many stones as possible in your home pit. Players alternate turns moving groups of stones counterclockwise around the board. At the start of the game, all of the pits are filled with the

The simple object of *Pits & Stones* is to collect as many stones as possible in your home pit.

same number of stones—the fewer you start out with, the simpler the game. The rankings run from "Easy," with one stone per pit at the start, through "Simple," "Tricky," "Slippery," "Difficult," and, finally, "Brutal," for a game with six stones per pit.

When it is your turn, you select one of the six pits on your side of the screen by using the space bar to highlight one and then pressing the F9 function key to select the pit. Once you've laid claim to your pit, the computer takes over the physical work of moving your stone or stones—one each into all pits in a counterclockwise direction. If the last stone moved lands in your home pit, you get to go again; if the last stone moved lands in an empty pit on your side, you capture any of your opponent's stones in the pit opposite yours. If you run out of stones, you collect all the stones not in your opponent's home pit.

(continued)

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CIRCLE 220 ON READER SERVICE CARD

PC ARCADE

Levels of Play

That's about all there is to the game—but don't jump to conclusions and think it's all that simple. Like chess and checkers, *Pits & Stones* can be played on many levels, and you will probably find that the upper levels will keep you quite engaged. The "artificial intelligence" of the computer opponent keeps up with you as you progress.

Of the two games reviewed, I found *El-Ixir* to be a bit more intoxicating. However, *Pits & Stones* is hardly a lightweight. On *PC Magazine's* rating scale from a low of 0 to a high of 6, *Pits & Stones* carries away a bunch of marbles:

FUN:	3.0
CHALLENGE:	4.0
SOUND/GRAPHICS:	4.0
TOTAL:	11.0



■ The ancients would have loved the *Pits & Stones* Help screen.

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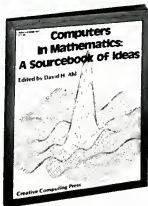
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Mastering UNIX: Two New Aids

Understanding UNIX is a good overview of the wide world of UNIX, while A Practical Guide to the UNIX System will help those with a "how-to" orientation unlock its mysteries.

Earlier this year when I had to test drive a UNIX-like operating system, I decided it was finally time for me to learn something about the AT&T prodigy. So I hefted my bike, cycled down to my local bookstore, and spent the better part of a Saturday evening skimming through a dozen UNIX guidebooks. Most of them I dismissed with a wave of my hand, sending them cartwheeling into the astrology section, where they more properly belonged. Then I found *Understanding UNIX*.

Which operating system do industry forecasters predict will comprise a \$7 billion market by 1986? Which operating system is not only "elegant, powerful, and simple" but "cryptic, unfriendly, and lacking in key features?" Which operating system has documentation so bad

that only a fragile oral tradition keeps any real knowledge of it burning in the hearts of men? The book answered all these questions, and more. (The answers are UNIX, UNIX, and UNIX.)



Written by a software product manager and a director of marketing from Plexus Computers, Inc., and published by a company famous for well-researched industry surveys, *Understanding UNIX* is the kind of book that is usually sold by think tanks to corporate vice-presidents for several hundred dollars a copy. It is aimed entirely at decision makers—the people who buy computers and their operating systems. It takes pains not to

guide you through any terminal sessions, assuming that you probably have more important things to do with your time, such as firing people who are unnecessarily boring. Instead, it attempts to answer two fundamental questions: "What is UNIX, and why is it attracting so much attention?"

Actually, this kind of knowledge turns out not to be so dangerous to us ordinary, non-decision-making people after all. Even someone who gets to touch live terminals twice a day can't but benefit from knowing where UNIX fits in the worlds of computing, business, and education and what precisely the "UNIX philosophy" is—apart from the misuse of a famous Greek buzzword.

Several chapters of *Understanding UNIX* are so untechnical that they could be reprinted in the *New York Times Magazine*, yet the authors waste no time delivering the goods. Their book clues you in on the hidden meaning of every acronym and neologism you'd ever need to become an overnight expert in the arcana of the UNIX environment. You get such secret code words as "kernels and shells," "XENIX," "generic micro ports," "System V"—even the nefarious "Berkeley."

A publication date in 1983, of course, could date any book, given how quickly the field changes. I crinkle my nose when

PC FOCUS

Understanding UNIX:

A Conceptual Guide

James R. Groff and Paul N. Weinberg
Que Corporation
7999 Knue Rd., #202
Indianapolis, IN 46250
(317) 842-7162

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ISBN: 0-88022-064-3

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BOOK REVIEW

I read that "IBM itself will probably offer UNIX on the PC in the near future" (knowing as I do about PC/IX) or when I learn that "at this writing" a user-group vote was scheduled to be taken sometime before the end of last year. On the other hand, rosy predictions of disk storage "exceeding a hundred megabytes in

drives costing only a few hundred dollars" are welcome in my household any day.

The review copy of *Understanding UNIX* that PC received in July looked like the copy I'd read this spring, but a loving line-by-line comparison revealed that its final chapter contains a few additional sentences. Nothing mind-boggling, unfortunately. IBM's PC/IX and the new System V.2 were mentioned, as were rumors of an "impending" 286 system from IBM and an AT&T "UNIX-on-a-chip" computer. So those of you who don't happen to work for AT&T or have a private source at IBM but need up-to-the-nanosecond analyses of the future of UNIX and the IBM-dominated microcomputer market will just have to wait for a real second edition—or subscribe to *PC Magazine*.



A Practical Guide to the UNIX System

Mark G. Sobell

Benjamin-Cummings Publishing Co.

2727 Sand Hill Rd.

Menlo Park, CA 94025

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Copyright: 1984

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ISBN: 0-8053-8910-5

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Help Is Here

A Practical Guide to the UNIX System is a more conventional publication than *Understanding UNIX*, but it's still probably the most pleasing UNIX book I've ever seen. I say "seen" rather than "read" because the best thing about it is the graphic design. It displays a greater variety of type sizes and styles than any computer book I know of. I'd love it if the sales of this book ignited a font war in the computer publishing industry.

In addition, well-chosen visual cues make the book's content easy to get at. Boxes enclose the numerous examples and are shaded to help the eye pick them out. Many excellent charts and diagrams use shadowing to create a three-dimensional appearance. Within the text, the names of such keys as the Escape and Tab keys are circled to leave no question

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BOOK REVIEW

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Mark Sobell, the author, is a UNIX documentation consultant in the San

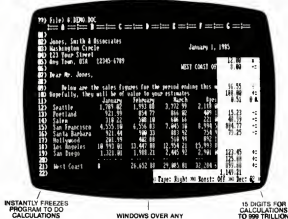
Francisco Bay area, and his writing is clear and uncomplicated. He addresses himself to those "with some computer experience, but little or no experience

with the UNIX system." His style is factual and friendly, with no self-referential indulgence. Only once did I suspect him of word coining—when he claimed that the process of expanding an ambiguous file reference is called "globbing."

Practical Focus

After devoting his first chapter to an overview of UNIX, Sobell launches into eight tutorials. These chapters are

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The eight tutorials are squarely aimed at the UNIX working class.

squarely aimed at the UNIX working class—unlike those of the Groff and Weinberg book—and Sobell recommends they be read at a UNIX terminal, where they can be immediately applied. His extensive descriptions of logging onto the system, using the `ed` line editor and exercising the most frequently used UNIX commands, ought to make any UNIX user comfortable in a few hours. Longer chapters on the `vi` full-screen editor, the `nroff` text formatter, and both the Bourne and C shells will satisfy the more ambitious reader.

The last half of this book—a full 200 pages—consists of a command glossary, five appendixes (including one on XENIX), and an index. While no substitute for the official documentation provided by your local software vendor, the command glossary is congenial, carefully laid out, and probably 3 pounds lighter.

Graphic purists will deny this book a perfect "10" on the grounds that a proportional font was used for the monospaced terminal examples, or that there is a superfluous blank in one example on page 91. Picky, picky. I say cart out another gold medal for the American team.

Cost Estimation On the PC

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EASYEST and ESPRI

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gram with serious capabilities. For each take-off item, you may take off two classes of work out of a maximum of ten. A database conversion factor allows you, for instance, to convert from length in feet to pounds for a specified diameter of steel pipe.

ESPRI, the "deluxe" version of *EASYEST*, adds work packages and direct entry of dimensions for calculation of quantities from formulas. *ESPRI* also offers take-off probes and voice verification of data entry.

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dent upon special crews and experience-based productivity factors. The estimating function works along with a resource file that contains a catalog of labor, material, and equipment prices as well as a list of suppliers and subcontractors available to bid on work in selected geographical areas. Best of all, the program lets you develop work packages based on crew makeup, productivity factors, and material and equipment components. It automatically develops a unit price from the prices of the individual components.

Uniquely, *QuickEST* also estimates tables (typically used as a reference for design parameters) and lets you define program statements. *QuickEST* also comes with a programming language, allowing display, prompt, editing, table look-up, calculation, comparison decisions, resource selection, and unit price verification or override.

QuickEST saves all take-off data so you can edit it later. It allows "plug" prices for quotations that will be received at time of bid and later compares the subcontractor bids.

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ability to use quoted or halted items. A quoted item is one for which you wish to base the final price on an incoming quote. Items whose prices fluctuate might be labeled "halted." The systems let you specify, on an individual or group basis, different actions for the program to take when it encounters a halted or quoted item.

DataTrak's products are designed to separate bidding from pricing and provide for very precise computing and distribution of markups such as labor burdens, material factors, tax, freight, and special labor factors. You determine what to mark up, where to put it, and how much. You can plug in quotes and recalculate the estimate for final bid submission. Both TOPS IV and ESTMAT include patented count and measurement probes for direct take-offs.

BidSheet Estimating

BidSheet Estimating allows you to maintain a price catalog with unit costs, lump sum costs, and productivity factors for computing unit costs. When entering take-off quantities into the estimate, you can enter a lump sum or unit cost, or you can compute the unit cost based on a productivity factor. You can also have the computer retrieve costs from the catalog. No matter where the cost comes from, the system computes the extended quantity-times-price figure and displays it on the screen.

BidSheet Estimating can allocate overhead and profit in three different ways: the percentage method simply multiplies each bid item by a percentage mark-up for overhead and for profit; the pro-rata method takes the total amount you have entered for overhead and profit and redistributes the cost over all bid items to produce a balanced bid; and, finally, the selected mode allows you to enter total dollar amounts on an item-by-item basis.

CES-II

The underlying principle of CES-II (Construction Estimation System) is the

creation of a type of database that serves as both the historical cost file and the estimate file. This trouble-saving arrangement means that instead of having to build the database before making an estimate, you simply build your estimate,

CES-II creates a database that serves as both the historical cost file and the estimate file.

which later becomes the database. New items can be added to the estimate/database and existing items used again as they are needed.

CES-II also allows you the convenience of grouping up to 15 items into a work package. User-supplied conversion factors assure proper calculations and totals.

Each line item is associated with a cost type to provide subtotals (the four cost categories are labor, material, subcontract, and a catchall, "other"). These subtotals may be "loaded" individually by a percentage factor, after which the cost of the job is totaled up and the overhead and profit markups applied. Each element receives a line-item number for assigning quantities. You can also use it to transfer the estimate to a job cost system. You have the option of assigning a vendor name to each line item and using it to produce a bill-of-materials report. CES-II gives you subtotals at user-defined breakpoints and at the Construction Specifications Institute (CSI) major divisions.

As you can see, each of the seven estimating programs discussed here has its strong points. The key in making a satisfactory decision is to choose the one that most closely matches your needs. ■

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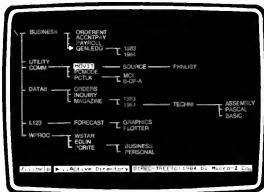
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- **PRINT** directory.....(To printer or disk) network

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Coping with the Numbers: PCs in Forecasting

The PC helps you through all steps of forecasting, from researching the market with on-line databases and calculating the effects of price on sales to presenting the forecast with graphics.

All business operations share a common goal: profitability. Profitability analysis, a form of financial forecasting, is a method most businesses use to predict income and profits. It begins with a single product forecast, consisting of a sales estimate for each year of, typically, a 5-year period. You begin forecasting by gathering data about competitive products and companies, market trends, development costs, anticipated sales, and target prices.

Extracting only the relevant data is difficult, but once you do, you can structure this pertinent data to produce the most logical forecast. The final step is to interpret and present the forecast results clearly. At each step, the PC can help you do a thorough job while saving time.

Gathering Data

First, some market research is necessary. A direct way to gather data on the market, customer buying decisions, trends, and competitive products is through information utilities and on-line databases. Such generalized databases as Dow Jones News/Retrieval, The Source, and CompuServe supply some company financial data. Financial reports sent by corporations to the Securities and Exchange Commission, often available online, are valuable sources of information



to identify competitors, their market share, and their financial stability.

News stories on particular industries can help you track trends and product needs, giving you a clue to a product's acceptability. Scanning news headlines by computer gives you a good historical perspective. For more detail, request the full text under a headline. The research stage can be time consuming, but spending a few hours with an electronic database reviewing market data enables you to discuss key assumptions with your company's marketing and development departments.

Two programs, *VisiLink* and the *Dow Jones Spreadsheet Link*, help you collect

and analyze financial data. The Dow Jones program lets you download financial data into the *VisiCalc*, *1-2-3*, or *Multiplan* spreadsheets to analyze company financial ratios or other indicators from such Dow Jones News/Retrieval databases as Media General, Disclosure, and the Corporate Earnings Estimator. With *VisiLink*, you can download data from the databases maintained by Data Resources, Inc., into a *VisiCalc* worksheet.

Designing a Model

Your next step is to design a forecasting model. Forecasts are based on product assumptions—descriptions of the

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FINANCE

product, its performance, cost, and its potential market. The purpose of the computer model is to measure these assumptions.

The way you construct your model depends on the type of product and its market. For example, you would model profitability for a consumer product such as a washing machine sold by a national retail chain using different assumptions than those for a computer system custom-built for a specialized market and sold by an internal sales force.

A computer model, beyond duplicating such work on paper, calculates different sets of data repetitively to obtain consistent results. Evaluating alternative assumptions about the same product (changes in price or availability, for example) is one of the most important jobs it can do for you. Financial analysts who set the final prices need guidance on how higher prices affect sales; a properly designed computer model can help you supply it.

Forecast results can be a set of numbers representing sales over a selected period of time or a yearly revenue estimate based on a price multiplied by the projected sales quantities. In either case, the numbers will affect probability.

The risk of any forecast depends on many factors. You can define this risk in your computer model in several ways; I like to express it as a "risk profile." For each of the 5 years in my forecasts, I assign a percentage expressed as a decimal. Assuming 100 percent product acceptance, the annual percentage multiplied by the total acceptances is the yearly amount of expected sales. I can vary the risk profile to match expected market changes.

You can easily assess the effect of different prices on sales. Financial planners often ask what happens to the sales volumes if the target price is raised 10, 15, or 25 percent. To answer, you can enter different target prices into your model within an area set aside for measuring your assumptions. Each price entered af-

fects sales volume. Products whose sales decrease rapidly when price is increased 5 to 10 percent are sensitive to price, while products whose sales survive a 20 percent price increase are insensitive. Such "sensitivity" analyses are crucial to arrive at a reasonable price. The PC is invaluable for the many time-consuming repetitions needed to determine optimum price/volume relationships.

**Financial analysts
need guidance on
how higher prices
affect sales; a
properly designed
computer model
helps you supply it.**

The brand of modeling or spreadsheet program you use doesn't matter, but an integrated package offers the advantage of a database manager that allows you to store your key assumptions for easy access from the spreadsheet.

Presentation

The best forecasts are defensible ones, and your defense begins with a good presentation. If you've done your homework by gathering the best assumptions, developing a sound method, and analyzing your estimates carefully, you can focus on presenting your forecast.

Business graphics are an essential element of forecasting. Whether you use paper charts prepared on a dot matrix printer or plotter or a video-displayed "slide" show is largely determined by the company. Though some companies are comfortable with simple black-and-white tabular data, others prefer 35-millimeter color slide presentations.

The current crop of personal computer graphics programs, whether part of an integrated package or not, has excellent



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chart-making functions and often support both printers and plotters. Many programs allow for computer-stored screens called up sequentially much like

a slide show, which is considerably less expensive than having slides produced at \$50 to \$100 each. You also can readily change the screens.

You can do high-quality plotting on paper or transparencies in more than one color for less than \$1,000. Plotted data are usually more legible than those the graphics feature of a dot matrix printer produces. But the advantage of dot matrix graphs is that you can include them in a written report prepared with the word processing part of an integrated program.

However you choose to display your forecast data, graphics make your presentation look better and appear more credible.

Once you complete the forecast of an-

However you choose to display your forecast data, graphics make your presentation more credible.

nual sales, you must set a price for the product. The first task is to gather data on cost from the development shop, marketing expenses from the sales department, and overhead from administration. You then combine the data in a computer model to determine the price you need to charge to obtain a reasonable profit.

By comparing this price to the target price in the forecast assumptions, a financial analyst determines the effect of the final price on sales. If the price is less than the target, sales may be higher than predicted. Higher prices may in turn drive down sales volume. The sensitivity analysis you prepare becomes valuable in helping you to set the best price.

The financial analyst and the forecaster have the same computer tools: spreadsheet, graphics, word processing, and database management programs. They can use the same software and exchange between their PCs for a coherent profitability analysis and a better bottom line.

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CIRCLE 223 ON READER SERVICE CARD

Computer Help for Insurance Agencies

The paper-intensive insurance industry is a natural candidate for computerization, and new PC software and services are making it cost-effective even for small agencies and specialized insurers.

Increasing competition from financial institutions, rising expenses, mounting paperwork, and more demanding consumers are just a few of the problems facing the insurance industry. Automation can help the industry cope with these pressures, but until recently it has not been cost-effective for specialized insurers and small insurance agencies. New programs and services for PC users are helping to change that situation.

Automation of office functions is more critical for insurers than for other businesses owing to the paper-intensive nature of their work. Large insurers have had mainframe systems for years and are now supplementing them with word processing, spreadsheet, and database packages for microcomputers.

Automation's potential for improving the profit picture in small agencies is even greater. Like large insurers, agencies are starting to invest in equipment and software to improve customer services and streamline their paper flow.

As insurance companies discover that more-efficient agencies mean larger corporate profits, they are beginning to offer microcomputer support to the agents who write their policies. Some distribute free software while others furnish terminal tie-ins to their home-office systems. Some even offer low-cost loans to help small agencies acquire the equipment.



Services

The Travelers Insurance Company, one of the industry leaders in this area, provides auto, homeowners, and life insurance software to agents who own IBM PCs. Travelers also has a variety of other insurance software and a communications facility, InterACS, which electronically links the company with selected agencies. And the company has established an agency automation subsidiary, EBS, that provides expertise to agencies while marketing software and hardware in a wide range of price categories.

Agency associations, an integral part of the insurance industry, have also been assisting the automation efforts of their

member agencies. Associations have sponsored idea-sharing forums, automation fairs, and PC training programs. Agency support groups also offer electronic information resources.

One such electronic association network is Insurance Value Added Network System (IVANS), established by IIR/ACORD, an insurance standard-setting organization. IVANS uses the IBM Information Network to allow agents and insurance companies to communicate with one another, so as to translate a variety of inputs to conform to one industry standard. Agencies do not pay a fee to use this service; the participating insurance companies and rating-and-credit bureaus cover the costs.

The Independent Insurance Agents of America has established an electronic management information service for its 220,000 member agents. A pilot phase, operational since January of 1984, offers association and industry news, stock prices for major insurers, and market share information. Agents can use the system's bulletin board to find other agents to write out-of-state business.

Several regional insurance associations are currently testing similar electronic services for their members. The Florida Association of Insurance Agents has announced such a service, called the Florida Bundle, and the Independent In-

BUSINESS

insurance Agents and Brokers organization is planning to make services available to its members through the existing Computer Accessed Insurance Rating network (CAIR). These services will include information banks in addition to rating services but will be available only on a regional basis.

Agent response to these new services has been positive. The insurance network so far is CAIR, which is provided on a fee basis through Insurance Systems, Inc., and already boasts over 800 insurance retailer and carrier subscribers. CAIR's services include ratings for personal and commercial auto insurance, driver histories, and electronic mail. CAIR's addition of the California Independent Agents and Brokers's services and membership base promises to dra-

matically increase its popularity in the California insurance industry.

Software

In addition to networks and other services, PC software can reduce the time

Rater Calc easily handles time-consuming "what if" situations.

agents must spend shuffling paper, making more time available for customer contact and sales. Agents can now buy disks containing information for rating universal life, commercial fire and auto, personal auto, or general liability lines.

Special software can also speed time-consuming community property calculations, disability projections, income objective comparisons, and probate cost-control computations. This makes it possible for agents to provide individualized financial and estate-planning services even to small clients, whereas in the past it was too time consuming to render these services to smaller clients.

Many mainframe software publishers now offer compressed versions of their mainframe products. *Rater Calc*, from Automated Insurance Resource Systems, Inc., of Naperville, Illinois, automates policy-premium quotations, covering inland marine, crime, general liability, workers' compensation, and commercial auto lines. Agents can use standard ISO rates or a nonstandard ISO rating plan. This package easily handles

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time-consuming "what if" situations.

Computer Income Planning Corporation, in New York City, markets the *Universal Life Proposal System*. This system, which includes customized mortality rates, issue rules, and other data, allows agents to develop accurate proposals individually suited to their needs. The *Universal Life Proposal System* is menu driven, with separate screens for premium, client, riders, schedules, and split-dollar entries and inquiries. Computer Income Planning offers demo disks with policy data for a fictitious company, giving potential users an opportunity to work with the package before purchasing it.

Metamorphics of Bala Cynwyd, Pennsylvania, sells a comprehensive agency automation system. The *Metamorphics* package supports marketing, invoicing,

accounts receivable, accounts payable, and general ledger functions. The comprehensiveness of the package is reflected in its high (\$2,650) price. The company offers agencies unique payment plans: four semi-annual payments or a 36-month payment plan.

Specialized Packages

To expand their market, software developers are also beginning to introduce specialized packages of interest to limited segments of the industry. One example, *Medpac*, processes health insurance claims and handles patient claim entry, patient file storage, benefit calculations, check processing, and billing. Farnell & Smith of Seaford, Delaware, markets the package, and its cost includes a year of maintenance.

General Data Systems in Philadelphia

supplies a number of software products to property and casualty insurers. One unique offering is *VIN/SCAN*, which verifies vehicle identification numbers (VINs) and assigns ISO or other rating symbols for all passenger and selected commercial vehicles. The package's ability to detect VIN errors before premiums are calculated can result in enormous savings. General Data Systems regularly updates its vehicle and rating information, which allows a company to keep its database current.

Although the industry got a late start on automation, the financial support of large insurance companies and the insurance associations, coupled with the computer's advantages for such a paper-intensive industry, will help it quickly catch up. Computers and insurance agencies are a natural combination. ■

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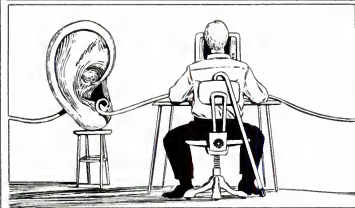
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CIRCLE 460 ON READER SERVICE CARD

PC Eyes and Ears

A low-cost hardware and software system called SEE uses Morse code and a hearing aid to translate the PC's characters into vibrations that blind and deaf users can interpret.



A marriage between the IBM PC and ham radio has opened a new window to the outside world for Raymond Boduch, a deaf-blind amateur radio enthusiast. Boduch helped two friends—fellow amateur radio operators Daniel Zuckerman and Joseph Hartmann—design SEE, a low-cost hardware and software system.

The problem they tackled was straightforward: A blind user can't "read" a computer monitor as a sighted person can; a deaf user can't "hear" the PC's speakers as a hearing person can; and a deaf-blind person can do neither in the traditional way. If letters and numbers were translated into Morse code,

however, the sounds could be felt as vibrations. A program to implement this idea, Boduch and his friends realized, could be made available at a reasonable cost.

Hartmann and Zuckerman, who knew each other through a local amateur radio club, met Boduch over the air. Boduch works as an electronics technician, assembling computer cables for a living. He lost his hearing and sight in early childhood and has been an amateur radio operator for about 25 years. The trio began its project more than 2 years ago and completed the first version of the program, written for the TRS-80, in March 1982.

How It Works

An inexpensive vibrotactile device is the key to the program. Combined with a standard keyboard, it gives deaf-blind users immediate feedback from what they type. With this device, they can scan or read the screen and change on-screen information. The equipment can be adapted for individual tactile sensitivity. All necessary hardware is readily available: A \$50 bone conductor hearing aid vibrates to audio signals and plugs into a \$140 Radio Shack stereo amplifier. The entire package, including the PC, is less expensive than a paperless Braille system that emulates a Teletype, according to Zuckerman.

At one end, the unit is connected to the PC's acoustic speaker with alligator clips. At the other end, Boduch attaches the bone conductor to a metal shoe horn and then fastens the device to the tongue of his shoe so that the whole shoe vibrates. With the software interface, as you press each key, it is echoed in Morse code on the speaker, which translates it into vibrations. You can set the speed of the screen-reading mode. The program also allows you to pause at any point, then resume "reading."

Visually impaired people often are more adept at Morse code than people with normal sight. Boduch, experienced in amateur radio, can read 40 to 50 words

Printer Switch for IBM PC Computer

MFJ-1248
\$99.95

Share a parallel printer between 2 IBM PCs with the push of a button. Eliminate trouble and confusion caused by plugging and unplugging cables. Save the cost of a second printer.

Quality printed circuit board construction gives maximum reliability and eliminates wiring, cross-talk and line interference. Features same type connectors as PC parallel printer port. 8x26 pin.

Centronics Parallel Printer Switch

MFJ-1249 2 inputs, 1 output. Push button switches. Female Centronics connectors. Printed circuit board construction. 10x18x26 in.

Multi-function RS-232 Switches

MFJ-1240
\$79.95
Choice of 8 models

Multi-function RS-232 transfer switches let you switch your computer among printers, modems, terminals, any RS-232 peripherals, monitor data/line failure, protect data lines from surges, and use as null modem for less cost than a switch alone.

Switches 10 lines (2, 3, 4, 5, 6, 8, 11, 15, 17, 20). LED data/line indicators monitor lines 2, 3, 4, 5, 6, 8, 20. Metal oxide varistors protect data lines 2, 3 from voltage spikes and surges. Push button reverses transmit-receive lines (2, 3). PC board eliminates wiring, cross-talk, line interference. Connects any one input to any one output.

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MFJ-1242	\$119.95	2 3	MFJ-1246	\$139.95	3 5
MFJ-1243	\$119.95	1 4	MFJ-1247	\$99.95	1 2

AC Power Centers

MFJ-1108 MFJ-1109, \$39.95. Add convenience, prevent data loss, head

bounce, equipment damage. Ray latches power off during power transients. Multi-filters isolate equipment, eliminate interaction, noise, hash. MOVs suppress spikes, surges. 3 isolated, switched socketpairs. One unswitched for clock, etc. Lighted power, reset switch. Pop-out fuse 3 wire, 6 ft cord 15A, 125V, 1875 watts. Aluminum case. Black 18x24x2 in. MFJ-1107, \$79.95. Like 1108 less relay 8 sockets, 2 unswitched MFJ-1109, \$129.95. Like 1107 but intelligent Switch on device plugged into control socket and everything else turns on. Others available.

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per minute. For the practiced user, Morse code has a significant advantage over Braille. After several hours of reading Braille, the fingertips lose their sensitivity. But Boduch "can sit back in his chair and receive information in Morse code 16 hours a day," Zuckerman said.

The program uses traditional international Morse code for letters and numbers but includes additional code combi-

In the future, the program may support networking for the deaf-blind.

nations for common computer symbols. Graphics are left undefined; a toggle allows users to skip over graphics rather than "hear" the "undefined character" sound of four dashes. The program also uses the PC's dedicated function keys. F1 and F2, for example, are used to identify the row and column at which the cursor is located, and F10 will jump to the next or previous word.

Since they conceived and designed SEE, Boduch, Zuckerman, and Hartmann have improved the software. One refinement allows users to differentiate between uppercase and lowercase letters by using different tones. Capitals are transmitted at 375 hertz and lowercase letters at 450 hertz. The program was written in assembly language, but Zuckerman said, "We hope to move the system to a higher-level language so that Ray can modify it."

In Use

Before he moved into the microcomputer world, Boduch corresponded with his wide circle of friends by using an electric typewriter. SEE and his PC allow him to proofread his work before he sends it out. With his favorite program, *Personal Editor*, he's developed a huge database of names, addresses, and per-

sonal information about all the people he's met and corresponds with. He's written macros to search this large database rapidly.

Boduch, who hopes to become a computer programmer, already knows BASIC and C, and he is learning Pascal. He also hopes to develop a telecommunications program to make information utilities, such as The Source and CompuServe, and electronic bulletin boards more accessible to the deaf-blind.

"He can accomplish everything with the Morse code interface and the keyboard that we can accomplish with our eyes. We just make it accessible for him," Zuckerman explained.

Boduch's success with the system notwithstanding, Zuckerman cautions that the program won't help all deaf-blind people. Out of an estimated 40,000 deaf-blind people in the United States, Boduch is one of the few who are employed. He has long maintained contact with the "outside" world through his amateur radio hobby and has taught Morse code to deaf and deaf-blind people. Most deaf-blind people, however, are tremendously isolated, said Zuckerman. "They don't want to deal with other people, and they don't have sufficient communications skills." Even so, he said, "More people want to use our system than we have time to help."

A deaf-blind woman in Massachusetts began using the system earlier this year, and several others have expressed interest. "It's not merely a matter of shipping them the software and the machine," Zuckerman said; SEE requires local volunteers to help train users and teach them Morse code.

In the future, the program may support networking for the deaf-blind, creating what Zuckerman calls "an electronic community" of people with these disabilities. "United with the larger establishment of handicapped individuals, deaf-blind citizens may then be able to broaden their participation in political and social activities," he said.

New On The Market

HARDWARE

HIDEY Hard Disk

A compact external hard disk drive designed to be placed beneath the user's PC, saving desk space.

The HIDEY controller card plugs into a single slot in the user's system and allows systems with PC-DOS 2.0 or higher to boot directly from the hard disk.

The 10-MB HIDEY drive incorporates its own power supply, a transient-protected power strip, and a well for storing the system's keyboard when not in use. A diskless version of the unit, called the BARE HIDEY, also has all of the features of the HIDEY except the hard disk, power supply, and

controller card.

(List Price: HIDEY, \$1,795; BARE HIDEY, \$149)

Personal Micro Computers, Inc.
275 Santa Ana Ct.
Sunnyvale, CA 94086

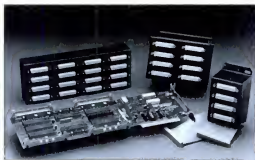
CIRCLE 710 ON READER SERVICE CARD

HOSTESS Board

A multi-user host adapter board that adds up to 16 additional serial ports to the IBM PC or PC AT.

Available *HOSTBIOS* software allows these ports to be addressed as COM3 through COM18, allowing the user's system to support multi-user operating systems such as XENIX.

The board is available with 4 or 8 ports standard (two boards are required



HOSTESS Board, Control Systems

for the full 16-port configuration). Separate rear panel RS-232 brackets connect to the board via a ribbon cable, with 4, 8, or 16 ports.

HOSTESS has been tested on the PC AT under PC-DOS 3.0, and is supported by multi-user operating systems such as XENIX, QNX, RMX-86, MULTILINK, and Coherent. It allows simultaneous communications on the IBM PC at speeds up to 9600 baud with 4 lines and 4800 with 8 lines.

(List Price: 4 ports, \$495; 8 ports, \$750; 16 ports, \$1,495; *HOSTBIOS* software, \$75)

Control Systems
2855 Anthony Ln.
Minneapolis, MN 55418
(612) 781-5043
Telex: 75-6601

CIRCLE 741 ON READER SERVICE CARD

Sensatrol

A digital sensor controller/data acquisition device that connects to the user's system via a stan-

dard RS-232 serial port. The sensor controller permits data from a number of external devices to be entered into the user's application through its eight channels for voltage measurement data and device control, at device-polling rates of two data points per second.

The user's application communicates with the controller using statements like BASIC's LPRINT statement to send commands and select channels; Sensatrol responds with a 4½-bit answer, which can be read by the application with statements such as BASIC's INPUT. The device features 100-microvolt sensitivity; user-selectable 300-, 600-, and 1,200-bps rates, with 7- or 8-bit, even, odd, or no parity; LED condition indicators for RS-232 diagnostics; and a wide range of plug-in external data-gathering devices. As many as 245 Sensatrol controllers can be linked from a single RS-232 port on the user's sys-



HIDEY Hard Disk, Personal Micro Computers, Inc.

HARDWARE

tem on a single three-wire connection.

The controller can be ordered in either 117 VAC or 12 VDC versions. Included with the digital controller is a temperature probe with BASIC application that is designed to familiarize the user with Sensatrol's operation. Other data acquisition devices are available directly from the manufacturer.

(List Price: \$385)
Data World Products
P.O. Box 33
Francistown, NH 03043

CIRCLE 731 ON READER
SERVICE CARD

MJ-22 Color Monitor

A medium-resolution 13-inch monitor that operates in either RGB or NTSC composite modes. The tilt stand-mounted monitor is capable of resolutions of 506 × 240 dots in a black matrix. Operating at a bandwidth of 18 MHz in RGB mode, or 3 MHz in

composite video, the unit can reproduce all 16 IBM colors chosen from its included test pattern.

(List Price: \$439.95)
Teknika Electronics Corp.
353 Rte. 46 W.
Fairfield, NJ 07006

CIRCLE 748 ON READER
SERVICE CARD

PC/VRTX

A plug-in board allowing concurrent processing of up to 256 interactive or non-related tasks. Based upon the VRTX Versatile Real-Time Executive made by Hunter & Ready, Inc., PC/VRTX supports PC-DOS concurrently with its own operating system, allowing users to access DOS functions and operations as tasks running under VTRX. In addition to retaining the utilities and applications programs available for PC-DOS, this capability of the board reduces the amount of programming needed to sup-

port and manage peripheral devices connected to the user's system. The PC/VRTX board requires about 250 microseconds to switch from one task to another, therefore effectively presenting real-time concurrent operations to users.

The PC/VRTX board incorporates its own 64K RAM memory subsystem, eliminating or reducing the need for additional external RAM boards. Memory space can be expanded up to 384K using 64K DRAMs; these memory arrays can be reserved for the user's applications running under VRTX or they can be made available to PC-DOS. Specific operating parameters, describing location, size, priority, and status of each task, as well as related message pointers and task queues, are stored in the board's operating system dedicated memory space. In addition, up to 128K of proprietary programs can be installed in the board as firmware programmed into ROM/EPROM devices.

Also included with PC/VRTX is a software support package containing utilities, function (procedure) calls, preprocessed applications programs, and high-level language interfaces supporting the Lattice and Microsoft C Compilers, IBM Pascal, and Intel PL/M-86 languages.
(List Price: \$1,495)
Dyad Technology Corp.
4040-G Sorrento Valley Blvd.
San Diego, CA 92121
(619) 450-1761

CIRCLE 733 ON READER
SERVICE CARD

ADVANTAGE!

A multifunction board designed specifically for the IBM PC AT, allowing the user to add up to 3 megabytes of RAM to take advantage of the PC AT's high performance bus and larger memory-addressing capability. In addition to its ability to hold either standard 64K or new 256K RAM chips, the ADVANTAGE! board can be ordered with one parallel port, up to two serial RS-232 ports, and a game port.

(List Price: With 128K RAM, \$495)
AST Research, Inc.
2121 Alton Ave.
Irvine, CA 92710
(714) 863-1333

CIRCLE 737 ON READER
SERVICE CARD

ProTalker

A plug-in board providing voice output capability. On-board data compression techniques are used to reduce the size of stored messages. Playback of stored audio can be randomly accessed under software control.

Software included with the board allows easy recording of playback messages. Also included with the software is the actual source code for assembly language device drivers, which allows advanced users to interface the board directly with most programming languages and applications.
(List Price: \$350)
Speech Ltd.
3790 El Camino Real, #213
Palo Alto, CA 94306
(415) 941-2490

CIRCLE 749 ON READER
SERVICE CARD



MJ-22 Color Monitor, Teknika Electronics Corp.



TriMux.212 Modem, Complex Systems, Inc.

TriMux.212 Modem

A three-channel statistical multiplexer with integral auto dial/auto answer Bell 212A modem. The device allows any of three users and/or peripherals to share a single phone line simultaneously.

The TriMux.212 modem features three modes of operation. The first allows data from three devices to be multiplexed onto a single regular phone line. This mode provides error-free transmissions from the three simultaneous sources through advanced packet-switching techniques and automatic retransmission of data in case of line errors.

In the second mode, the TriMux.212 operates as a regular single-user 1,200-bps modem, accessible from any of the three stations linked to the device. It is compatible with any 1,200-bps modem on the other end of the phone line in any of its modes.

The third mode of operation is as a local data switch. Even when the modem/multiplexer circuitry is not in use, the device allows any of the three local devices to access and communicate with each other.

The TriMux.212 includes a built-in conversion utility that allows two de-

vices running at different speeds to communicate with each other. All setup and operation is done through on-screen menus generated by the device. (List Price: \$1,495) Complex Systems, Inc. 4930 Research Dr. Huntsville, AL 35805 (205) 830-4310 Telex: 88-0114

CIRCLE 750 ON READER SERVICE CARD

Micro-Ear Voice Command System

A standalone voice recognition and command unit that connects to the user's system via an RS-232 serial port. The Micro-Ear Voice Command System allows up to 256 words to be defined by the user. The speaker-dependent defined vocabulary is stored in the unit's own battery-backed memory, as is the communications software translating spoken language into computer commands.

The system includes a microphone, a 9-volt power supply, and a user's guide. For the IBM PC, the software bundled with the device includes *EAR DOS*, a system utility permitting voice control from within any PC-DOS application. Also available from the manufacturer are video game programs designed for voice control and other

software intended to demonstrate the use of the system with actual applications.

(List Price: \$479)

Arctec Systems
9104 Red Branch Rd.
Columbia, MD 21045
(301) 730-1237

CIRCLE 712 ON READER SERVICE CARD

BarPrint Printers

Two thermal bar code printers that are capable of producing Code 39, Interleaved 2-of-5, Codabar, or UPC bar codes on user demand. The thermal printheads of the units allow print densities of 7.8 characters per inch in Code 39, with higher densities available for Interleaved 2-of-5 and Codabar printing.

BarPrint 100 is designed to produce labels that are up to 4 inches wide and of unlimited length; BarPrint 600 produces labels of up to 2½ inches wide. Both models allow the user to program customized formats, with an unlimited number of bar codes and alphanumeric characters possible for each label. Alphanumeric text can be

printed above, alongside, or below the bar codes, with user-selectable font sizes.

(List Price: BarPrint 100, \$5,500; BarPrint 600, \$2,800; optional label cutter, \$400) Barcode Industries Inc. 17 Barstow Rd. Great Neck, NY 11021 (516) 466-5770

CIRCLE 744 ON READER SERVICE CARD

Cermetek Security Modem

A Hayes-compatible 110- to 1,200-bps modem offering a range of security features protecting the user's system from unauthorized access. At the basic level of protection, the modem requires the caller to have a valid password and to specify a callback number. The modem checks the given callback number against those stored in its nonvolatile memory for that password, dialing the number if all is correct.

Beyond this basic level of protection, the Cermetek Security Modem supports a more elaborate password/callback scheme, in which the unit dials back the caller



BarPrint Printers, Barcode Industries Inc.

on a second line. The second line's phone number can be kept secret, which prevents interception of the transmitted data. The user has the option of selecting security measures to be used from four built-in levels—none at all, password only, password with callback, and password with callback on second line.

Other security provisions included with the modem are an audit trail that lists both valid and invalid attempts to access the computer; a means by which outgoing calls from the computer can be prevented, by requiring a dial-out password; and the required use of a physical key to change security levels, passwords, and callback numbers stored in the modem's battery-backed memory. The modem is fully compatible with the Bell 212A and 103 standards and is compatible with any communications software using the Hayes control standard.

(List Price: \$695)
Cernetek Microelectronics, Inc.

1308 Borregas Ave.
Sunnyvale, CA 94088
(408) 752-5055

CIRCLE 738 ON READER
SERVICE CARD

Sumicom 1120 Printer

A low-cost daisywheel printer capable of printing at speeds up to 18 characters per second. The Sumicom 1120 accepts Qume standard print-wheels and ribbon cartridges and comes with a Centronics parallel interface. Options available with this printer include an RS-232C serial interface, a 12-bit parallel Qume-compatible inter-



Sumicom 1120 Printer, Sumicom, Inc.

face, a forms tractor-feed mechanism, and an add-on cut sheet feeder.

The Sumicom 1120 Printer, weighing 21.1 pounds, provides proportional spacing and accepts paper that measures up to 13 inches wide. Software-selectable print characteristics include unidirectional incremental printing or bidirectional logic-seeking modes.

(List Price: \$495)

Sumicom, Inc.
17862 E. 17th St.
Tustin, CA 92680
(714) 730-6061

CIRCLE 732 ON READER
SERVICE CARD

SOFTWARE

C.L.A.I.M.S.

A loss analysis and claims records management program for professionals in the insurance industry. The software, written in RM/COBOL, maintains all information relating to claims filed and losses incurred by an insurer. An automatic takedown facility is included that adjusts records when a payment is applied. Loss summary reports can be produced by the program for monthly, year-to-date, or inception-to-date time periods, as well as for user-specified time periods, current or past.

C.L.A.I.M.S., an acronym for Complete Loss Analysis and Interactive Maintenance System, also includes the disk-based I.T.C. business directory, which contains the names, addresses, and other pertinent information for insurance companies or carriers, underwriters, reinsurance companies, producers (brokers or agents), employees, claims adjusters, insureds, and prospective producers. The software can also produce client registers, Rolodex cards, and mailing address labels.

(List Price: \$795)

Requires: 128K RAM, 10-MB hard disk, PC-DOS, RM/COBOL.

Insurance Technology Consultants
P.O. Box 6610
Fullerton, CA 92634
(714) 773-1754

CIRCLE 717 ON READER
SERVICE CARD

MScript

A low-cost word processing program that features capabilities usually associated with higher-priced systems. MScript features include wordwrap; insert; deletion by character, word, line, or block; full-screen editing; "cut and paste" block moves; headers and footers; special print formatting; and global search and replace.

In addition, the word processing software allows all or any portion of text from a previously stored document to be added with simple commands to a new document.

MScript can also be used as a full-screen editor for BASIC programming, as well as to create and store mailing lists for form letters and labels. Its Print menu allows such print formatting options as right justification, hanging indents, automatic page numbering, and embedded printer control commands.

During editing, an on-screen status line shows the current cursor location relative to both the document (column and line) and to the current screen (window). A command and status menu identifies the current document and gives a tally of the amount of memory used, the amount remaining on disk, the word and line counts, and the size of the window.

(List Price: \$79.95)

Requires: 64K, one disk drive, PC-DOS.

Micro-Systems Software, Inc.
4301-18 Oak Cir.
Boca Raton, FL 33431
(305) 391-5077

CIRCLE 713 ON READER
SERVICE CARD



MScript, Micro-Systems Software, Inc.



AVANT CPA Review System, Tri-Corp International

AVANT CPA Review System

Test preparation software for candidates reviewing for the CPA Exam. Following the user's own pace, the AVANT CPA Review program tests the candidate's knowledge of accounting practice and theory, business law, and auditing. The program provides guidance for incorrect answers, and an abbreviated, timed CPA Exam is included for practice.

(List Price: \$575)

Requires: 64K, one disk drive, PC-DOS.

Tri-Corp International
P.O. Box 22509

Kansas City, MO 64113
(800) 255-0551

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Finance I F.A.P.

A financial analysis program suitable for both home and business users. The software calculates one of several variables or unknowns involved in the analysis of loans, savings plans, compound interest accounts, annuities, stocks, and bonds. The program's investment routines use net present value analysis to provide a valuation of a stock issue or bond. This

analysis is based on the users required rate of return and is suitable to determine if an investment is a good buy or not.

Finance I F.A.P. is function key driven, with error-checking and magnitude-scaling procedures that run automatically prior to preparing an analysis.

(List Price: \$130)

Requires: 128K RAM, one disk drive, PC-DOS.

dCOM Computer Associates
811 Kersey Rd.

Silver Spring, MD 20902
(301) 649-3529

CIRCLE 747 ON READER
SERVICE CARD

Word List

A computerized dictionary of 27,000 common English words. Unlike conventional spelling checker programs, *Word List* is intended as an accessible means of verifying a word's spelling prior to its use in a document. Designed for use with windowing programs such as <<MEMORY/SHIFT>>, the *Word List* dictionary can be expanded by the user as needed. Utilities to add, delete, or change list entries are included on the program's disks.

(List Price: \$19.95)

Requires: 64K RAM, one 320K drive, PC-DOS.

Robert L. Nicolai

4038 N. Ninth St.

St. Louis, MO 63147

(314) 621-7618

CIRCLE 716 ON READER
SERVICE CARD

Professional FORTRAN (RM/FORTRAN)

A full implementation of FORTRAN-77 for the IBM PC, with a number of language extensions more commonly found on mainframe versions.

Professional FORTRAN (RM/FORTRAN), the 8088/86 PC-DOS form of Ryan-McFarland Corp.'s *RM/FORTRAN* for 68000-based computers, includes features such as object code optimizations, a symbolic interactive debugger, and support for arrays of unlimited size.

This implementation of the high-level programming language was certified error-free by the Government Services Administration (GSA) on the IBM PC-XT. It can be purchased as *RM/FORTRAN* directly from the manufacturer and is also being distributed by IBM as *Professional FORTRAN* through IBM's chain of retail and corporate sales outlets. This implementation of FORTRAN-77 works with an 8087 (for the PC and PC-XT) or 80287 (for the PC AT) floating point coprocessor, permitting a user's mainframe-developed VS FORTRAN applications to run on the smaller systems with little loss of performance.

Language extensions included with the new imple-

mentation include symbolic names of up to 31 characters, an include statement, Industrial Real-Time FORTRAN (IRTF) binary-pattern and bit-processing functions, Hollerith and hexadecimal constants, and the additional data types found in mainframe applications (INTEGER*2, INTEGER*4, LOGICAL*4, REAL*4, REAL*8, and COMPLEX*8). The incorporated interactive debugger supports examination of variables, breakpoints, single-step execution, and similar features normally associated with mainframe languages.

(List Price: \$595)

Requires: 192K RAM, one disk drive, PC-DOS 2.x or 3.0, 8087 or 80287 math coprocessor.

Ryan-McFarland Corp.
609 Deep Valley Dr.
Rolling Hills Estate, CA 90274

(213) 541-4828

CIRCLE 746 ON READER
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Transfer/1-2-3

A utility for Lotus's 1-2-3 spreadsheet program, permitting the user to transfer selected fields of numeric or text data from any ASCII file directly into a Lotus worksheet. *Transfer/1-2-3* assigns cell addresses and automatically creates new worksheets as required by the user.

(List Price: \$90)

Requires: 128K RAM, two disk drives, PC-DOS 2.x, Lotus's 1-2-3.

Hawaiian Software Co.
4901 Morena Blvd., #203
San Diego, CA 92117
(619) 270-6316

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PRACTICAL ACCOUNTANT. . .
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SOFTWARE

PC Paintbrush

A mouse-driven, freeform graphics program compatible with a wide range of color and monochrome graphics hardware combinations. The software incorporates 14 utilities, 5 different menus, and 30 different backgrounds for creating images. It also can capture, enhance, and print graphics with text created by other programs such as *WordStar* and *Lotus's 1-2-3*.

PC Paintbrush offers the user six text fonts, including Roman, Greek, and Script, which can be manipulated in seven styles (such as light, bold, italics, and outline) in seven sizes from 9 to 72 points. Print controls allow the user to set the height, width, and margin of the printed page, and either a selected portion or an entire drawing can be printed. It also prints sideways, permitting the software to be used to create banners on continuous form paper. In total, *PC Paintbrush's* print controls include 17 driver routines for a range of dot matrix printers and plotters.

The software will work with digital mice from Mindset, Summagraphics, Mouse Systems, and Microsoft, and with any IBM-compatible joystick. (List Price: \$150)

Requires: 192K RAM, one disk drive, PC-DOS 2.x, color/graphics adapter, graphics monitor, compatible mouse.

International Microcomputer Software, Inc.
633 Fifth Ave.
San Rafael, CA 94901
(415) 454-7101

CIRCLE 725 ON READER SERVICE CARD

Perfect Series Software

Completely new versions of the *Perfect* software line, with separate, integratable programs for word processing, spreadsheets, file management, and communications. The first four releases, *Perfect Writer*, *Perfect Calc*, *Perfect Filer*, and *Perfect Link*, share a common command structure, pop-up command menus and help screens, and the ability to share files between programs. Written in the C programming language, the four programs are designed for the first-time business user.

Perfect Writer, which includes *Perfect Speller* and *Perfect Thesaurus*, features single-key control of search-and-replace functions, block operations, and other editing functions. A split-screen capability allows the user to simultaneously work with two documents at once. The *Perfect Speller* and *Perfect Thesaurus* components each contain 50,000 words that are easily accessible while working on a document. Print formatting features include automatic pagination, boldface, and italic fonts, and the ability to number and position footnotes automatically.

The file management program in the series, called *Perfect Filer*, includes 16 predefined data-entry forms, as well as simplified procedures for producing pre-printed business forms, form letters and mailing labels, invoices, and financial reports.

The *Perfect Calc* spreadsheet program allows the user to set up formulas using simple English com-

mands and permits up to 15 different worksheets to be held in memory at the same time. Advanced statistical functions present in the software include linear regression, interpolation, and standard deviation. The software can also import and export data files to any of the other programs in the series.

Communications functions for the series are handled by the *Perfect Link* program. Features of this program include menu-driven procedures for logging onto commercial on-line databases; support for a range of modem types and features, with automatic modem installation; and the ability to read from and write to disks formatted under 26 different operating systems. *Perfect Link* also emulates a variety of termi-

nal types in addition to standard TTY, including the VT-52, IBM 3101, TeleVideo 920, or Lear-Siegler ADM-3A terminals.

All of the *Perfect Series* programs include a global main menu interface simplifying transfers between the programs. With the exception of *Perfect Link*, each of the *Perfect Series* programs supports the use of color monitors and digital mice.

(List Price: *Perfect Link*, \$129; all others, \$199 each)

Requires: 128K RAM, two disk drives, PC-DOS. *THORN EMI Computer Software, Inc.*
3187 C Airway Ave.
Costa Mesa, CA 92626
(714) 751-3778

CIRCLE 726 ON READER SERVICE CARD



Perfect Series Software, THORN EMI Computer Software, Inc.

SOFTWARE

Savant/Spreadsheet Databridge

An add-on program for Savant's *The Technical Investor* program, permitting the charting software to transfer data from on-line databases such as the Dow Jones News/Retrieval Service to spreadsheets such as Lotus's 1-2-3, SuperCalc, or VisiCalc. After the data has been worked on with the user's chosen spreadsheet program, it can be transferred back to *The Technical Investor* for charting and analysis.

In addition, the add-on program can translate general DIF files into ASCII text files and vice-versa.

(List Price: \$145)

Requires: 128K RAM, two 320K drives, PC-DOS, color/graphics adapter, Hayes or Novation modem, *The Technical Investor*, spreadsheet program. *Savant Corp.*
P.O. Box 440278
Houston, TX 77244
(713) 556-8363

CIRCLE 715 ON READER
SERVICE CARD

Appgen Query Language (AQL)

An English-like query language for the UNIX operating system, with a command syntax that allows flexible sentence structures to be used to carry out complex inquiry and reporting tasks easily. Advanced UNIX users can incorporate AQL's powerful set of functional processors into applications without programming code.

AQL is derived from APPGEN, a commercial applications generator with a "variable relational" database management sys-

tem with variable-length records, fields, and multiple-value fields. In addition, the query language is compatible with ten APPGEN-based financial applications available from AQL's producers.

The query language features relatively free-form input of word order and syntax in commands; automatic or user-specified reports in either columnar or non-columnar formats; sorting capabilities on a number of descending/ascending fields or sort key combinations; the ability to create automatically executing command files; and the ability to search, sort, and select records on the values of any field in the records.

AQL is available for all levels of UNIX (3, 4.2, and 5), as well as the XENIX version and is compatible with networks of up to 16 terminals.

(List Price: \$695)
Requires: 256K RAM, 10-MB hard disk, UNIX- or XENIX-based operating system.

Software Express
2925 Briarpark, #700
Houston, TX 77042
(800) 231-0062
(713) 974-2298
Telex: 79-2333

CIRCLE 719 ON READER
SERVICE CARD

ACTS Church Management Programs

Two programs for the management of financial and membership records of churches and similar organizations. Written in dBASE II, with source code, the two programs can handle the financial and DBMS needs of churches without limits to



CostPLAN, DacormFG Software Systems

membership size.

The financial program is designed to handle the general ledger and special income and expense accounts. They include provisions for checkbook accounts, payroll, and donation accounting. Also included are five preprogrammed financial statements.

The ACTS data management program provides utilities to maintain members' profiles, directory listings, visitor follow-up recording, attendance tracking, and shepherding programs. They offer profile-search functions and the ability to generate mailing lists that can be integrated with word processing software.

(List Price: Each program, \$300; both, \$500; manuals alone, \$40)

Requires: 128K RAM, two 320K drives, PC-DOS, dBASE II.
Burr Computer Consultants, Inc.
6402 Thoreau's Way
San Antonio, TX 78239
(512) 650-4342

CIRCLE 721 ON READER
SERVICE CARD

CostPLAN

A cost data history and forecasting system for small to medium manufacturing firms. The program can be used provide to consistent cost history reporting from all departments, and to prepare charts of account listings by account number, giving name, or alphabetically by account name, giving account number.

CostPLAN produces both a 12-month forecast and a 12-month seasonal pattern by month for all accounts. For long-range planning, it can produce a 10-year forecast of account activity by month and account. Up to 60 months of expense activity can be entered for each account, permitting month-by-month and year-by-year comparisons.

(List Price: \$150)
Requires: 196K RAM, one disk drive, PC-DOS.
DacormFG Software Systems
13330 Bishop Rd.
Box 269
Bowling Green, OH 43402
(419) 354-3981

CIRCLE 714 ON READER
SERVICE CARD

SOFTWARE

REPMOD

A real estate project planning program based upon an original mainframe system. **REPMOD** is designed to cover a range of real estate project analyses, with routines for cost allocation, accounting, financing taxes, and fiscal impact.

The software can handle multiple for-sale and income property land uses, multiple operating facilities, and multiple allocable cost centers. It can automatically generate a profitability analysis, income statement, and cash flow for each land use and operating facility. A balance sheet is prepared at the total project level.

(List Price: \$4,000)

Requires: 512K RAM, 10-MB hard disk, PC-DOS.

Project Economics Inc.
2041 Rosecrans Ave. #257
El Segundo, CA 90245
(213) 640-2700

CIRCLE 724 ON READER
SERVICE CARD

INVESTREC

A template for Lotus's 1-2-3 program, allowing the user to keep track of up to seven different investment portfolios with up to 20 stocks, options, mutual funds, and so forth, in each portfolio. The add-on program is completely menu driven and makes extensive use of Lotus macros for efficient operation.

INVESTREC generates four different printed reports, providing a brief summary position, a consolidation of historical and current data, and a summary of change. From the program's menus, the user can

add, delete, update, and print reports with one or two keystrokes. Other menu functions provide for computer percentage dividend yields, percentage price appreciation/depreciation, and percentage total return for each issue on record based on the initial investment and the number of days the issue was held. Also featured is a simple rest routine that saves data already entered while presenting a new worksheet.

(List Price: \$62.50)

Requires: 256K RAM, two disk drives, PC-DOS, Lotus's 1-2-3.
N. Gutman
17 Horseman Cir.
Simsbury, CT 06070
(203) 658-7789

CIRCLE 722 ON READER
SERVICE CARD

PC-TEST

A debugging tool for the assembly language programmer. **PC-TEST** uses a menu-driven, "fill-in-the-blanks" approach to assembly programming, which allows novices or experienced programmers to concentrate on the programming problem rather than the tools used.

It supports multiple location, multiple occurrence breakpoints, and single-step execution of a program with constant memory display. Any text file can be browsed, and the state of the test program's screen can be checked from any debugging function screen.

PC-TEST includes its assembly language source code, which permits the tool to serve novice programmers as an introduction to assembly language

while permitting advanced users to tailor the program to their needs.

(List Price: \$75)

Requires: 128K RAM, one disk drive, PC-DOS.
A.J.M. Associates
P.O. Box 54068
San Jose, CA 95154

CIRCLE 718 ON READER
SERVICE CARD

CASHFLO

A budget accounting program that tracks daily expenses against a defined monthly budget. Using menus, **CASHFLO** sets up files—called accounts—for income, expense, cash, checking, savings, or credit, up to a maximum of 126 categories of accounts. In each year, up to 6,800 transactions between accounts can be recorded, including split transactions involving more than two accounts. There is also a prior year carry-over column to set up initial account balances.

CASHFLO can budget by account for each month of the year. It can change created budgets at any time, with facilities available to produce current reports on the user's financial situation. Account balances can be reported in cumulative or non-cumulative form, and balances can be displayed as bar graphs. The totals of eight accounts can be combined for one grand total.

(List Price: \$69.95)

Requires: 192K RAM, two drives, PC-DOS 2.x.
International Software Consultants
P.O. Box 18280
San Jose, CA 95158

CIRCLE 709 ON READER
SERVICE CARD

ZSTEMpc

A VT100 terminal emulator program supporting 132-column screen displays via high-speed horizontal windowing, double height/double width characters, and user-selectable scroll rates. Written in 8088 assembly language, the software appears as a VT100 terminal with advanced video option to the host mainframe system.

Other features of **ZSTEMpc** include full keyboard softkey/macro programming, and bidirectional disk file transfers in either straight ASCII or XMODEM protocols. The software supports concurrent serial and/or parallel printer use and transfer speeds of up to 38.4K baud with throughput of 15K+ baud in 80-column mode and 9K+ baud in 132-column mode.

(List Price: \$150)

Requires: 128K RAM, one disk drive, PC-DOS, color/graphics adapter, COMn port.

KEA Systems Ltd.
Dept. ZPC-1
311-811 Beach Ave.
Vancouver, B.C.
Canada V6Z 2B5
(604) 687-2744

CIRCLE 739 ON READER
SERVICE CARD

Pascal BIOSLIB

A set of assembly language tools for the Pascal programmer, extending the IBM and Microsoft Pascal Compilers by adding interfaces that take advantage of previously unaddressed characteristics of the IBM PC's hardware. Among the extended Pascal capabilities provided by the **Pascal BIOSLIB** routines are dot-

SOFTWARE • ACCESSORIES

addressable color displays and graphic representations of data, the ability to use up to 40 possible function keys within an application, and the ability to address and set baud rates automatically for the PC's COM ports. The routines also allow the programmer to produce sounds and music from within a Pascal program.

Pascal BIOSLIB includes documentation explaining each of its routines, with details of how the routines relate to both the PC's hardware and ROM BIOS. Also included is a demonstration program showing some of the routines in actual use for training purposes.

(List Price: \$45.95)
Requires: 64K RAM, one drive, PC-DOS, IBM or Microsoft Pascal Compiler.
Next Generation Software
144-10 Roosevelt Ave.
Flushing, NY 11354
(718) 762-2833

CIRCLE 730 ON READER SERVICE CARD

db.VISTA

A database management system for software developers working in the C programming language. Consisting of a data definition language processor and a library of C functions, **db.VISTA** database management system allows the user to define and manage data file-based applications easily.

The structure of a **db.VISTA** database is specified with its built-in data definition language (DDL). This command language's processor compiles the file specifications into data dictionary tables to be used by

the software's internal library functions. The functions are called by the C programmer to access and manipulate the database. The program uses a B-tree for key field indexing, permitting any and all fields to be index keys.
(List Price: \$495)
Requires: 128K RAM, one disk drive, PC-DOS 2.x, C compiler.
Raima Corp.
11717 Rainier Ave. S.
Seattle, WA 98178
(206) 772-1515

CIRCLE 723 ON READER SERVICE CARD

Spotlight

A desk management program providing an appointment book, phone book, note pad, index card file, calculator, and access to DOS operations from within any applications program. In operation, **Spotlight** remains in the background as the user works with any applications software. With a single keystroke, the application is suspended and a window into **Spotlight** appears, providing access to any of the program's functions. Another single key resumes the application where it was interrupted.

Highlights of **Spotlight's** separate facilities include:

- **Appointment Book**—a monthly calendar format with an alarm system capable of automatic reminders of important appointments;
- **Phone Book**—up to 36 different phone lists, each with up to 500 entries;
- **Note Pad**—a text editor capable of creating memos up to eight pages in length;
- **DOS Filer**—allows the

user to perform DOS operations, including disk formatting, without leaving an application.

The program's memory-resident portions occupy 75K of RAM.
(List Price: \$149.95)
Requires: 128K RAM, one drive, PC-DOS 2.x.
Software Arts
27 Mica Ln.
Wellesley, MA 02181

CIRCLE 727 ON READER SERVICE CARD

IMAGES-2D

A program permitting the user to perform static and dynamic analyses of geometric structural elements. This modeling and analysis program can handle up to 100 nodes with 300 degrees of freedom. Using multicolor screen plots of a model's geometry, dynamic results can be obtained for static loading, natural frequencies, and mode shapes in response to input. Loading capabilities include user-specified displacement and uniform distributed load features.

Two versions of **IMAGES-2D** are available, for static only or static and dynamic analyses. Elements include: beams and trusses, triangular plates, and model springs. Also provided are a method for describing beam shear deflections and a rotational pin code release.

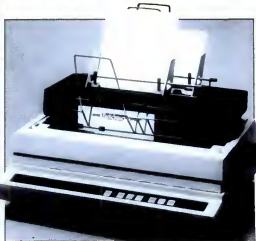
(List Price: Static only, \$500; static and dynamic, \$1,300; demo disk, \$30)
Requires: 192K RAM, one disk drive, PC-DOS, color/graphics adapter, 8087 math co-processor.
Celestial Software Inc.
125 University Ave.
Berkeley, CA 94710
(415) 841-7175

CIRCLE 729 ON READER SERVICE CARD

ACCESSORIES

RS-1100 Sheet Feeder

A double-bin sheet feeder eliminating the need for special firmware PROMs or technical adjustments for use. Instead, the feeder has an initialization program on



RS-1100 Sheet Feeder, Rutishauser of America, Inc.

ACCESSORIES



Datasaver, Cuesta Systems, Inc.

diskette that automatically instructs the user's word processing program in the use of the feeder.

The snap-on feeder incorporates an electronic sensor that correctly positions paper during printing. Each of its two bins holds 230 sheets of paper and is capable of holding 12- by 14-inch forms.

(List Price: \$1.795)
Rutishauser of America, Inc.
10345 Brockwood Rd.
Dallas, TX 75238
(214) 343-9154

CIRCLE 740 ON READER SERVICE CARD

AD-2/UNI-1 Portable PC Stand

An adapter base for the IBM Portable PC and Compaq systems. Used with the UNI-1 monitor base available from the manufacturer, the AD-2 base allows these portable systems to tilt and swivel on a desktop for more comfortable positioning and viewing.

The stand elevates the front of the portables up to 2 inches, with 22 degrees tilt and swiveling

of 360 degrees in either direction.
(List Price: AD-2 adapter, \$19.95; UNI-1 base, \$49.95)

Curtis Mfg., Inc.
305 Union St.
Peterborough, NH 03458
(603) 924-7803

CIRCLE 720 ON READER SERVICE CARD

PC-diary

A printed record book providing forms for recording a user's personal computer warranty information and usage logs. PC-diary also includes provisions for recording access numbers for software support, service contracts and other insurance data, records of supplies purchased, and important phone numbers of business contacts. Intended to be kept by the user's system, the incorporated usage logs can help justify deductions taken for business use of the system.

(List Price: \$19.95)
Computer Diaries
P.O. Box 836266
Richardson, TX 75083
(214) 931-2034

CIRCLE 728 ON READER SERVICE CARD

Datasaver

A backup power system that provides regulated and filtered line power under normal conditions, automatically switching to its internal battery in the event of a power outage. It provides from 5 to 15 minutes of emergency power to shut down systems safely.

Datasaver features line-voltage transfers within 1/100 of a second, a crystal control for flicker-free monitor operation, LED

status indicators, and an audible alarm to alert the user to the loss of AC power. With the addition of an external battery plugged into the unit's rear jack, the Datasaver can power a personal computer from any 12-volt power supply, including car batteries.

Two models of the backup power unit are available. A 90-watt model can power the IBM PCjr and similar equipment with low power requirements; the 200-watt model can handle the load from a complete IBM PC or PC-XT system. International power models are also available from the manufacturer.

(List Price: 90-watt model, \$350; 200-watt model, \$495)

Cuesta Systems, Inc.
3440 Roberto Ct.
San Luis Obispo, CA
93401
(805) 541-4160

CIRCLE 711 ON READER SERVICE CARD

New on the Market Submission Guidelines

1. Please include the retail price, distribution methods, and details of both hardware and software requirements needed for an end-user to properly use your new product. For software especially, this includes required amount of RAM, number and type of disk drives, operating system(s) supported, and any peripheral equipment needed.
 2. Releases should be typewritten double-spaced on one side of the paper. Copies of advertisements for the product may be included, but in most instances we need more information about a product than is typically included in an ad.
 3. Include telephone contacts for marketing and technical questions.
 4. If available, include black-and-white glossy photos of the product, 4 x 5 in. or larger.
Please note that all products are run on a space-available basis. It is impossible to guarantee publication of a product announcement for any particular issue.
- Inclusion in **New on the Market** is at the exclusive discretion of the editor.

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OKIDATA 93P	\$649.00
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CIRCLE 277 ON READER SERVICE CARD

Technical Bulletin

No. 2 in a series.



SUBJECT: Engineering a LAN for Maximum Flexibility.

Quantum Software Systems Ltd. proudly announces QNX 2.0 — the Ultimate Distributed Network Operating System. QNX 2.0 is now available for the IBM-PC, IBM-AT, PC compatibles, DEC Rainbow and TANDY 2000. If you have been waiting for a Real-time Multi-tasking Multi-user Operating system with fourth generation LAN support, then QNX 2.0 can offer you what the competition can't even begin to promise for the future.

QNX 2.0 integrates the Local Area Network architecture right into the heart of the operating system, at the fundamental level of intertask communication allowing tasks to communicate transparently with other tasks across the whole network. This means that any task (program/application) may access ANY serial port, ANY printer or ANY disk on the network. There are no artificial restrictions. Every PC with a disk is a potential file server. PCs without disks will automatically BOOT over the network.

QNX on the IBM-PC AT:

QNX is the only Multi-tasking Multi-user Operating system available for the AT. It is available in both networked and single machine configurations. At about 2.5 times faster than the QNX 8086 PC based systems, and 10 times faster than other multi-tasking operating systems on the same processor, QNX is the ideal program development environment.

O/S	Computer	Processor	Measured time
QNX™	IBM-PC AT	80286	480 usec
XENIX™	Intel-286	80286	4,930 usec

File Security:

Designed with extensive file security features, QNX 2.0 provides login protection with network wide file permission checking based on 255 groups of 255 users. In addition, each PC user may control network access to devices attached locally to their machine.

Distributed Processing:

The QNX LAN supports distributed processing as well as distributed devices. Tasks may be executed on remote stations as easily as they may be executed on the local work station. This allows pure processing elements (PCs without keyboards or displays) to be plugged into the network to be used as an

un-committed processing resource. This is ideal for real-time, process control, data acquisition and data communication applications.

Global Communications:

QNX supports the full implementation of X.25 allowing connection to public networks such as Telenet and Datapac. This allows you to link geographically separate LANs together providing true global area networking.

Cost Effective Growth and Flexible Solutions:

QNX is affordable, and will work with the PCs you use today and those you will use tomorrow. You may mix and match different brand PCs on the same QNX network with absolute ease. Multi-user expansion may be accomplished by adding terminals to PCs or PCs to the network. You can start your multi-user application on a single PC with 1 to 10 attached terminals. Once your single processor starts to show signs of degradation, add another PC and connect terminals to the new processor. If the disk becomes the major bottleneck, you may add hard disks to other attached PCs to distribute the processing. Applications which are very CPU intensive may wish to limit a single user to each processor and expand the system with low cost diskless PCs used as work stations. QNX does offer a truly cost effective and flexible solution to your applications needs.

Portability:

QNX 2.0 is portable. The operating system is independent of the physical local area network. It is available in a form suitable for porting to other 8088/8086/80186/80286 computers in the consumer, educational and industrial market place. QNX is ROMable and can operate in as little as 128Kb RAM.

DOS Compatibility:

PC-DOS version 2.1 can run as a task under the QNX 1.2 or 2.0 operating systems. QNX will also allow transparent access to the DOS file system partition and floppies.

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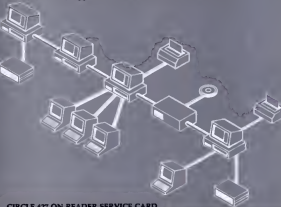
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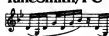
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(415) 856-6281

Stanford University Hospital Personal Computer Society

c/o Kevin E. Volkman
701 Welch Rd., #310
Palo Alto, CA 94305

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c/o Lee Wersel
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Modesto-Turlock IBM PC User Group

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The Riverside IBM Computer Club

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1. a. Title of Publication: PC, b. Publication No. 07452500. 2. Date of filing: October 1, 1984.
3. Frequency of issue. BI-Weekly. a. No. of issues published annually: 26. b. Annual Subscription Price: \$34.97.
4. Location of known office of publication: One Park Avenue, New York, New York 10016.
5. Location of headquarters or general business offices of the publishers: One Park Avenue, New York, New York 10016.
6. Names and complete addresses of publisher, editor, and managing editor: Publisher, Jeff Weiner, One Park Avenue, New York, New York 10016; Editor: Bill Macrone, One Park Avenue, New York, New York 10016; Managing Editor: Barry Owen, One Park Avenue, New York, New York 10016.
7. Owner: PC Communications Corporation, One Park Avenue, New York, N.Y. 10016; Ziff-Davis Publishing Company, One Park Avenue, New York, N.Y. 10016.
8. Known bondholders, mortgages, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages or other securities: None.
10. Extent and nature of circulation:

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A. Total no. copies printed (Net Press Run)	227,244	271,850
B. Paid Circulation		
1. Sales through dealers and carriers, vendors and counter sales	62,381	72,200
2. Mail subscriptions	99,032	123,700
C. Total paid circulation (Sum of 10B1 and 10B2)	161,413	195,900
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E. Total Distribution (Sum of C and D)	166,660	202,890
F. Copies not distributed		
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2. Returns from news agents	57,952	64,600
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CIRCLE 341 ON READER SERVICE CARD

EDITED BY PAUL SOMERSON

User-to-User

PC readers use this forum to help one another by passing along their questions, solutions, comments, and complaints.

A WordStar Tip

Here's a tip from Mr. WordStar, Steve Manes, on importing files. User-to-User receives files in all sorts of configurations, the most common of which is straight single-spaced ASCII, with carriage returns at the end of each line and an extra space between paragraphs.

The way to transform files exactly like the one mentioned above into pure WordStar is as follows:

1. First do a search-and-replace ("QA") 'N'N with 'P'J'P'M. For options, enter ng, then hit the Enter key, and then hit the up arrow key.
2. Search-and-replace ("QA") 'N with a space (hit the space bar once). Same options as in #1 above.
3. Search-and-replace ("QA") 'P'J'P'M with 'N'N.
4. Reformat everything with 'QQB1.

It's important to do everything in the exact order described above. In the three search-and-replaces in steps 1 through 3, either add a "b" option to the second step to search backward, or go to the beginning of the file each time you "QA."

Rebooting from within BASIC

REBOOT.BAS and REBOOT2.BAS (see Figure 1) are BASIC programs that can be used to reboot the system. This "warm boot" is not exactly like Ctrl-Alt-Del because REBOOT.BAS will check the



memory as if the machine were just turned on. Use REBOOT2.BAS if you're going to compile the program.

Michael V. Behrens
Honolulu, Hawaii

A nice dirty trick or a good method for preventing unauthorized program entry, say, after three invalid passwords.

Batch Copying Improvement

The batch file COPYNEW.BAT (see Figure 2) is an easy way to copy files selectively from one drive to another if the files to be copied are not on the targeted drive. COPYNEW verifies that the source and target drive designators have been entered and that they are not the same.

If you want to copy all of the files from the disk in drive A: that are not already on

USER-TO-USER

```

100 'REBOOT.BAS -- BY MICHAEL V. BEHRENS
110 'Interpreter Version
120 DEF SEG=&HFO00
130 REBOOT=&HE05B
140 CALL REBOOT

100 ' REBOOT2.BAS -- BY MICHAEL V. BEHRENS
110 'Compiler Version
120 DEF SEG=&HFO00
130 DEF USRO=&HE05B
140 REBOOT=USRO(0)

```

Figure 1: These programs, which reboot your system, are far interpretive BASIC and compiled BASIC.

```

echo off
rem This program copies files selectively from one drive to another
rem only if the file IS NOT on the target drive.
rem The syntax is:
rem          copynew x y
rem          where x and y are the source and target drives. Note these are
rem          entered like x not like x:
rem
if %1 == x goto error1
if %2 == x goto error2
if %1 == %2 goto error3
echo on
%1:
for %K in (*.*) do if not exist %2:%K copy %1:%K %2:%K
goto end
:error1
echo Source drive name missing
goto end
:error2
echo Target drive name missing
goto end
:error3
echo Source and target drive names can't be the same
goto end
:and
echo on

```

Figure 2: These batch files copy files from a source drive to a target drive only if they are not on the target drive.

drive C:, you would type (at the DOS A> prompt):

COPYNEW A C

and hit the Enter key. Note that you omit the colons after the drive letters; the batch file puts them in for you.

Ronald Ogg
Orinda, California

You have to be careful you don't enter colons after the drive letters. This idea was submitted by a number of readers, but COPYNEW adds some intelligent error traps. Readers—keep sending in your favorite powerful batch files.

Tickler Helper

Yet another day-of-the-week program, WEEKDAY.BAS, is shown in Figure 3. While it's not as versatile as the two algorithms presented in PC, Volume 3 Number 15, it's shorter and executes faster. Its roots stretch back to the early days at DEC—I admit to translating it from (ugh) COBOL. It works for dates after 1976, and I've never had a problem with it.

Jeffrey B. Otterson
Londonderry, New Hampshire

This can indeed live up a program, especially if you're writing a time manager or a tickler file.

(continued)

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USER-TO-USER

```
100 * WEEKDAY -- By Jeffrey B. Otterson
110 DIR WKDAY(7),OFFSET(12)
120 DATA "Sunday", "Monday", "Tuesday", "Wednesday", "Thursday", "Friday", "Saturday"
130 DATA 0, 3, 3, 6, 1, 4, 6, 2, 5, 0, 3, 5
140 FOR L=1 TO 7:READ WKDAY(L):NEXT L:FOR L=1 TO 12:READ OFFSET(L):NEXT L
150 T=VAL(RIDW(DATE$,7,4)):R=VAL(RIDW(DATE$,1,2)):D=VAL(RIDW(DATE$,4,2))
160 X=INT(((1-Y-1976)+12-R-3)/360011/48)
170 X=X-Y-1978+OFFSET(R)+D-1+2*INT(X/7):Z=X-Z*7+1
180 PRINT "Today is ",WKDAY(Z)," ",DATE$
```

Figure 3: This short program translates dates to days of week.

```
ren X1 temp
ren X2 X1
ren temp X2
```

Figure 4: A simple batch file for swapping the name of a program with that of a newer version.

Name Swapping

I often revise batch files or BASIC programs that are connected to other batch files or BASIC programs. I don't like to delete the previous version of the program or file because it may come in handy if a bug crops up in the newer version. But, since the new version has a different file name, I'd normally have to go into all the other BASIC programs or batch files that refer to this filename and change it. However, the simple NAMESWAP.BAT batch file (see Figure 4) will swap the names of the two files. If the new version does turn up with a bug, I just use NAMESWAP to put things back the way they were originally. To switch the names of two programs, just type NAMESWAP NAME1 NAME2.

WordStar Self-Stripper

Many programs are available to transform a WordStar file into standard ASCII format, but the job can be done from within WordStar. There are two parts to this task: special control characters such as dot commands and underline toggles must be removed, and the high bit, which WordStar turns on to mark the ends of words, must be turned off. Obviously, the first part can be done in WordStar, and the second part can also be accomplished without leaving WordStar. The sequence of commands is a bit complex, but if you have

Prokey, it can be reduced to three keystrokes. (It cannot be reduced to a single keystroke because of a WordStar quirk that I will discuss below.) In order to understand how the procedure works, it will be helpful to understand a few points about WordStar's use of high bits.

If you display a WordStar file on the screen using the DOS TYPE command, you will see funny-looking characters at the ends of words. WordStar simply adds 128 to the ASCII code for each character that occurs just to the left of a space. Normally, this will be the last letter of a word, but when a punctuation mark such as a comma or a period is attached to a word, it is the punctuation mark that gets its high bit turned on. Also, please note that the last character before a hard carriage return is normal.

In addition, you will find a number of accented i's sprinkled around the screen, which is WordStar's shorthand for a soft carriage return. The accented i is ASCII 141, which is just ASCII 13— and the carriage return character—plus 128. In order to generate an ASCII file, you must replace this character with a hard carriage return, in addition to turning off the high bit in characters that precede a space.

Also, note that if you add or delete characters from the end of a word when revising text, WordStar does not readjust the high bit until you reformat. This lets the magic happen. Here's how to do it:

1. Go to the top of the file.
2. Pick any character that does not occur in the text—a backslash or vertical bar will usually do—and issue a search-and-replace command ("QA") telling WordStar to replace every space in the text with the new character. This command should be issued with the global gn option.

USER-TO-USER

Hit the carriage return then the cursor up key. This will turn off screen updates and speed up the process considerably.

3. Go to the top of the file and reformat the entire text using "QBB1". (The 1 causes this operation to take place at maximum speed.) Once you eliminate the spaces, there is no place left where the high bit can be turned on, and all high bits will be turned off during the reformat operation. When this operation is complete, hit any

WordStar does not distinguish between hard and soft returns.

key to proceed. At this point, you'll get a message telling you that the word is too long for the margins, but ignore this message.

4. Return to the top of the file and use "QA" to replace the characters you have inserted with spaces. Again, the operation should be done globally, without confirmations and without screen updates. When it is completed, you'll have your original text back, and all high bits preceding spaces will be off. Of course, you still have to handle the soft carriage returns.

5. Go to the top of the file and use "QA" again to search for all carriage returns (hitting "PN" in response to the prompt inserts "N" in the prompt) and replace them with carriage returns. Huh? It seems that when you tell WordStar to search for a carriage return, it does not distinguish between hard and soft returns. When you insert a carriage return ("N"), WordStar always inserts a hard return. Again, the search should be global, without confirmations or screen updates. When this is completed, you're done.

Prokey users should assign sequences 1 through 3 to one key and sequences 4 through 5 to a second key. Before hitting the second key, any key must be hit to turn off the global reformat command. This is

the WordStar quirk that I mentioned above. When a global reformat is running, you can hit any key to stop it, and if it reaches the end of the text, it continues to stare at you until you hit a key. If you attempt to add a key to your Prokey sequence after "QBB1", WordStar will see it and stop reformatting. Still, three keys are not much work.

There are three last points to be made about using this procedure. First, the text should be in its final, formatted form before beginning. Also, if you are going to print the file from DOS, it is a good idea to have a hard carriage return as the last character in the file. The reason for this is that some printers, such as the Epson MX-80, will keep a line in its buffer and will not print it until it encounters a carriage return. Third, if the procedure is used as described, it can be run in either document or nondocument mode.

Harold Brown
DeKalb, Illinois

One of the greatest things about WordStar is that you can do virtually every necessary operation from within the program, without ever having to exit or switch command modes, etc. This is more proof. However, it's also a bit complex, especially since there are dozens of high-bit strip-pers out there (see PC, Volume 2 Number 4, for one). Also, note that while it's often necessary to use "P" in a search or search-and-replace operation in front of a literal character such as "J" or "M", you don't need the "P" in front of a normal "N" carriage return.

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CIRCLE 340 ON READER SERVICE CARD

PC Tutor



AT from the Ground Up

I recently purchased a PC AT to use in my software development work, so I'm tooled up and ready to answer when you send in questions about using the AT.

Although I haven't yet gotten any AT-related questions, I thought you might be interested in some advice on several points that came up during my first hands-on investigation of the AT.

● **Hard disk.** I bought a stripped-down version of the AT to have the fun of configuring it. The first order of business was to install a 360K floppy drive and a hard disk to accompany IBM's special, built-in 1.2-megabyte floppy drive.

On the AT, the same controller card is used for all three drives: the hard disk, the 360K, and the 1.2-megabyte floppy drives. Because the controller is so versatile, I thought I could plug in any old hard disk. Well, not quite . . .

Plugging in a hard disk is a simple procedure. All you need is one 20-line connector. But getting the hard disk to work the way it should is another matter entirely. The problems begin when the AT's SETUP program asks you which hard disk you have—and prompts you for a number between 1 and 15 without indicating what those 15 different hard disks are. All the

documentation says is, "Look at the number on the hard disk." These numbered stickers are on drives purchased from IBM, but no others.

I finally found the necessary information in ROM beginning at address F000:E401, where each entry in the following table takes up 16 bytes.

If your hard disk isn't one of these, you'll need to create a list that includes its set of parameters. To see just how to do this, you'd need to wait until the AT's

Hard Disk Type	Cylinders	Heads
1	306	4
2	615	4
3	615	6
4	940	8
5	940	6
6	615	4
7	462	8
8	733	5
9	900	15
10	820	3
11	855	5
12	855	7
13	306	8
14	733	7
15	RESERVED	

Technical Reference manual is available.

Some of the hard disks listed here have different write precompensation than others; types 2 and 6, in particular, differ in the cylinder where precompensation begins. When the precompensation is wrong, you get consistent read errors from a range of cylinders.

After you've set up the AT for your particular hard disk, you need to initialize the disk. This process isn't the same as running IBM's DOS FORMAT program, but there's a rather simple approach to doing the initialization using IBM's *Ad-*

vanced Diagnostics disk. (Borrow this disk, if possible, because it's usually supplied with the hardware maintenance manuals at the lordly sum of \$295.)

With the *Advanced Diagnostics* disk inserted, boot up your system. (You'll

The PC AT uses piggybacked RAM chips—two 64K-bit chips soldered together.

probably see a 16xx error message, because the hard disk is not yet initialized.) Run the SETUP program to inform the system about which hard disk you have, then select the system check out option to reach the fixed disk format menu. From this point on, initialization should be easy. Just keep in mind that the initializing routine includes no error messages; if you find it takes more than 20 seconds to initialize one cylinder, you're doing something wrong.

Note that the AT's hard disk uses a voice coil positioner, which works on the same principle as the driver in an audio speaker. With this method, the AT's average access time is a mere 30 milliseconds, compared to the 103 milliseconds required by the XT.

● **Floppy drives.** Even my stripped-down AT came with a 1.2-megabyte floppy drive. This dual-speed drive (300 and 360 rpm) reads and writes standard 360K double-sided disks, as well as the new 1.2-megabyte, 96 tracks-per-inch disks. It's one of the quietest and fastest drives I've seen.

IBM's new drive, however, doesn't format 360K disks correctly. It's a trivial

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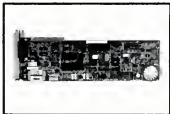


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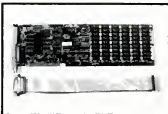
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task to plug in a standard 360K drive in the AT's lower slot to make disks that are compatible with older PCs. If you don't have to supply disks for use on PCs, you might want use that slot for a second 1.2-megabyte drive to gain storage capacity.

● **RAM expansion.** The PC AT uses piggybacked RAM chips—two 64K-bit chips soldered together to obtain the effect of 128 kilobits per chip. To expand the stripped-down AT from 256K to 512K of RAM, you must purchase a 256K memory upgrade at a \$495 price that must make IBM very happy. Not a bad profit for 18 chips that retail for \$5 each!

In the spirit of adventure, I tried installing some old 64K chips in the piggyback slots, but had no luck.

The AT's motherboard is the first I've seen that is clearly designed to hold 1 megabyte of 256K-bit RAM chips. There's a jumper next to the piggybacked RAM chips that is unlabeled and undocumented. The AT's maintenance manual, however, calls it a "RAM Jumper," so I'd bet it allows for 256K chips in the future. However, no PC software would be able to work with the motherboard's 1 megabyte of RAM, because the video display normally resides in the middle of that memory.

● **DOS 3.0.** The AT comes with DOS 3.0. This version isn't upgraded much from DOS 2.0 or 2.1; the revisions are primarily to provide drivers for the AT.

One enhancement is a neat RAMdisk driver. There's a listing of this program's source code, which is interesting because it shows how to access more than 1 megabyte of memory.

Some of the most obvious bugs in DOS 2.0 are fixed in 3.0, but DOS 3.0 seems to have introduced a few of its own.

One of the more annoying bugs in DOS 2.0 was that the SET COMSPEC= command never worked as described in the documentation. Now, by running DOS 3.0, you are assured that entering this command

```
SET COMSPEC=C:\COMMAND.COM
```

causes the operating system henceforth to load the command interpreter from drive C:. If you had typed that command, however, with a space between the equal sign (=) and C:, then the next time DOS tried to load the command interpreter, you would get this error message

```
Invalid COMMAND interpreter
```

and the system will halt, forcing you to reboot.

Other bugs of DOS 2.0 remain in 3.0. For example, entering this command

```
ECHO random^Z
```

(the line ends with a Ctrl-Z) still causes an "insufficient disk space" error.

A nice, new feature of DOS 3.0 lets you run a program that's not in the current directory by calling the program by its entire name. For example, no matter where you are in the DOS file structure, this command

```
C:\EDIT\EDLIN MYFILE
```

will find MYFILE and run it through the EDLIN program held in my \EDIT subdirectory.

IBM loses points for not updating DEBUG.COM so it could understand the new instructions added with the 80286 processor. So much garbage appears on the screen when new instructions are encountered that DEBUG's unassembler routine is virtually useless as a tool for learning 80286-specific instructions. I also encountered some unusual bugs while trying to trace programs that manipulate the 80286's registers. The release of DOS 3.1 this winter might fix these deficiencies, but I wouldn't hold my breath.

Another problem is aggravated in DOS 3.0. IBM seems to want only one version of DOS on the market at a time—one DOS that will run all of the company's PC hardware. The result is that every time IBM releases a new computer, the DOS utilities swell to support it and all earlier

machines. No matter which machine you use, more and more memory chips and disk space must be sacrificed to hold an ever-growing operating system.

Hunting for PEEKs and POKES

Q: Now that I've had my PC for a while and have taken a few programming courses, I'd like to do neat things using machine language and PEEKs and POKES. Is there a good book that teaches this?

One way I thought these techniques might be used is to disable the Ctrl-Break key combination in a BASIC password program run in an AUTOEXEC.BAT. Can you help me with this?

John Ma
Cheshire, Connecticut

A: A nice explanation of absolute memory locations (a less whimsical term for what PEEKs and POKES deal with) is in a book-and-disk package called *Peeks 'n Pokes* by Brett Salter of Atlanta. He describes a fair number of those memory locations and lists several BASIC programs as examples. Try contacting the publisher for more information (Data Base Decisions, 14 Bonnie Ln., Atlanta, GA 30328).

I don't know of any easy way to disable the Ctrl-Break key combination soon enough to ensure that a user couldn't bypass your password program. An assembly language routine would have to be very complicated to obtain this effect because BASIC bypasses most of the keyboard processing conventions of DOS. Although BASIC's own ON KEY statement makes it easy to disable Ctrl-Break, a fast-fingered user would have the opportunity to disrupt such a routine before it took effect.

The PC Tutor solves practical problems and explains points of general interest. If you'd like to see your questions answered here, drop a line to PC Tutor, *PC Magazine*, One Park Avenue, New York, NY 10016.

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CIRCLE 217 ON READER SERVICE CARD

COMING UP



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Technical Report on the PC AT

A complete report on IBM's fastest, most powerful, and most advanced personal computer, the PC AT. *PC Tech Journal* coverage of the topic will include such features as an in-depth technical review of the hardware, operating software, and an overview of IBM's new network.

PC AT coverage will include:

- a technical hardware review
- a discussion of configurations and pricing in the IBM family
- an examination of the new features in DOS 3.0

- an overview of IBM's PC Network
- a PC XENIX overview
- an evolutionary look at the AT's Intel iAPX 286 chip, and
- a complete PC AT bibliography

Implementations of Modula-2

PC Tech's on-going coverage of Niklaus Wirth's high-level programming language, Modula-2, continues with a comparison of three compilers for the language, one each from Logitech, Volition Systems, and the Modula Research Institute.

Floating-Point Conversion

The third and final installment in our series of articles on floating-point arithmetic includes a sampling of routines for binary-to-decimal floating-point conversion on the IBM PC.

Previewing with a Thumbnail Sketch

Black & White breaks ground as the first real previewing tool for writers. It allows you to examine thumbnail-size pages of your reports—complete with graphics—prior to printing.

Word processing programs have made the job of writing more complex. Rather than just capturing words and ideas on paper, you must now concern yourself with formatting the paper output, particularly if you're responsible for producing technical documentation, reports, books, newsletters, and software manuals.

Furthermore, if your documents incorporate charts, graphs, and boxes, you must view text not only as a collection of words, but as a set of graphic elements that appear in a frame—the formatted page. This "page orientation" will become more and more important as writers increasingly rely on personal computers to produce their work instead of professional typesetters and graphic artists.

Unfortunately, most word processing programs don't offer you much help with page layout. Although some allow you to



scroll through text to view end-of-page marks or even show you a graphic representation of the page format, none allows you to preview pages before printing. With most word processing programs, the only way to see how your output will look is to actually print out a draft or to carefully check all page breaks on-screen. Neither approach is completely satisfactory.

Innovative Software

Now, with the introduction of *Black & White*, a new program from Chelsea-Skye, Inc., page previewing for text created on IBM PCs and compatibles is available for the first time. *Black &*

White is a fantastic new tool that allows you to preview your documents on the screen or alternatively in a thumbnail-size printout.

Viewing reduced pages of text like the "thumbnail sketches" graphic artists use gives you instant feedback on which paragraphs are too long, where too many short paragraphs are grouped together, and where widows (a short, usually one word, last line of a paragraph) and orphans (a short last line that is separated from its paragraph and appears at the top of the next page) occur. You can also check to make sure that graphic elements and text are well balanced and that illustrations do not fall at page breaks. In ad-



Black & White

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PROGRAMMER'S GUIDE TO CP/M[®]

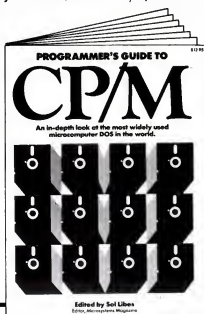
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Here's an important collection of CP/M insights that you'll never find in any CP/M manual. CP/M is the most popular microcomputer DOS in use today, and this widespread use has generated many innovative techniques and enhancements of CP/M. *Programmer's Guide to CP/M* tells you what these enhancements are and how to put them to use, how to get around apparent limitations of a CP/M system and why CP/M is far more versatile than you might have imagined. Every article in *Programmer's Guide to CP/M* originally appeared in MICROSYSTEMS between

January 1980 and February 1982. Except for this collection, these articles are now unavailable! *Programmer's Guide to CP/M* gives you an in-depth look at CP/M from the viewpoint of the programmer—the individual who creates the software that interfaces directly with CP/M, or who is installing CP/M on systems for which configurations do not already exist.

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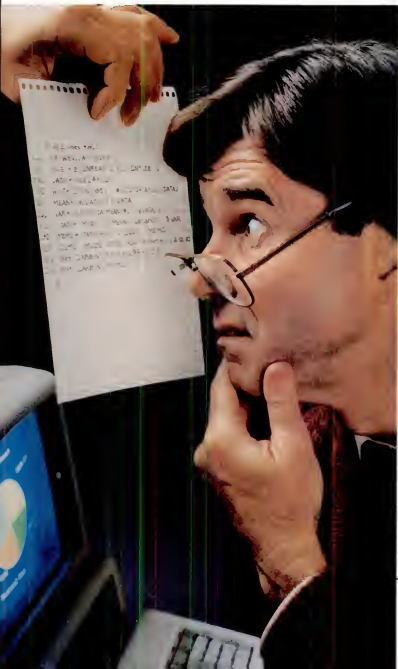
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WRITING

dition, *Black & White* lets you link text files and provides a word count whenever you want one.

The *Black & White* word processing program is primarily designed to work with ASCII files. Since most word processors either produce ASCII files or have conversion utilities, they can be used with *Black & White*. With the popular *WordStar* and *MultiMate*, *Black & White* saves you the trouble; it will convert these files into readable ASCII form itself.

Previewing Pages

Once you create a document with your word processor and file it, you may boot *Black & White* to preview the document before printing. *Black & White* will actually "print" the document to your computer screen, but the pages will appear dramatically reduced—12 pages on each screen. Viewing 12 pages at a time gives you the advantage and convenience of a bird's eye view of your work's layout

without the clutter of having 12 pieces of paper spread out all over your desk.

The program uses a color graphics card and high-resolution mode to paint a pixel to stand for each letter in your document. The result is a stunning representation of your page, 1 inch wide by 1½ inches high. *Black & White* adheres to your margins and formatting exactly in this miniature representation: Centered lines will be centered, indented paragraphs will be indented, and line spacing will be as you set it. However, your actual text does not appear on these miniature pages; it is represented by dummy type.

After printing the first 12 pages of your document on the screen, *Black & White* stops. At this point, using function keys, you can move on to view the rest of the document's pages, 12 at a time, or pause and send a hard copy of the screen to your printer. The printout includes page numbering and the name of the file you are previewing.

Accepts WordStar Commands

Black & White acts just like a printer, except that it is printing pixels on the screen instead of characters on paper. Like a printer, it needs to receive commands. These codes, or cues, should be

Black & White acts just like a printer, except that it prints pixels on the screen instead of characters on paper.

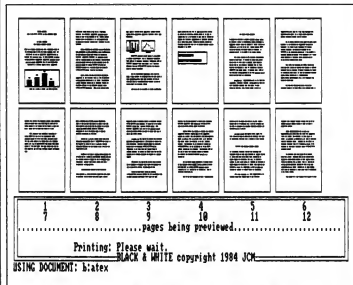
very familiar to *WordStar* users. In fact, one of *Black & White*'s strong points is that it comes configured to respond to *WordStar*'s dot command cues.

If you use another program that does not use dot command cues, *Black & White* lets you create a cue file that tells *Black & White* how to format your file. The cues are simple to embed and allow you to control the top and bottom margins, page offset (left margin), conditional pages, page length, page advance, line spacing, and the chaining of documents.

A Valuable Tool

Black & White is especially useful to writers who produce long documents, such as manuals or reports. The program previews as many pages as your file holds. If your 96-page document is in one file, it will preview all 96 pages. If you do not use virtual filing, it links your shorter files together.

Black & White gives you a great deal of performance for its amazingly low price of \$25. It should be considered standard equipment for any writer concerned about the appearance of a printed document. ■



A printout of 12 thumbnail-size pages produced by *Black & White*. The software uses dummy type for its preview pages.

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Coming Up



Business Graphics

PC looks at business graphics packages. We'll explore what makes business presentation graphics effective and how to use such programs to support and enhance decision making. Tom Christopher and Robin Raskin review three hardware/software graphics offerings: *Genographics Series 1000*, General Parametrics' of *PictureIt* and the Videoshow processor, and Digital Research's *Dr. Draw*, *Dr. Graph*, and *Dr. Presentation Master*. Dick Fowler compares PC graphics to images produced by the mighty Cray, and Dan Wexler reviews two touch-screen hardware systems.

Megatrends

PC contributor Werner Frank predicts that microcomputers will dramatically affect the world of computing in the coming years. He identifies 15 changes they will bring about and examines the impact of the microcomputer on computing in general. Frank believes there will be a computer on every corporate desk and in every home; the use of computer-based word processing will become the primary means of recording and transmitting the written word; and the computer industry will market its products the same way the auto industry markets cars—with an emphasis on having the latest and neatest-looking model.

PC also sends Brad Lemley out to see what leaders in fields ranging from computer science to futurism to theology have to say about Werner Frank's predictions and about the future of computers. A few of those queried say Frank overstates the future role of computers, while others believe he plays it too cool. Perhaps this mixed reaction means that no one can accurately predict how computers will ultimately affect our society.

The Best and Worst Computer Products of 1984

In honor of our 26th issue, which is actually the first issue of 1985, PC salutes 26 of the best microcomputer-related products of 1984 and pans 26 of the worst.

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